

Introduction to the Assembly Details
for the Johnson Viking Ranger Transmitter

The care with which any piece of equipment is built determines, to a large extent, the satisfaction and value which can be derived from its use. Follow each step of the assembly details carefully and completely before performing the indicated operation, rereading any step which may not be immediately clear. Use the illustrations whenever a doubt about dressing and training of leads, or positioning of a component arises. Refer to the Content List which follows the Introduction to find the location of illustrations or assembly instructions in the text.

The Viking Ranger kit has been packaged for the convenience of the builder. Check the kit parts against the packing slip, consulting the listing on each envelope to identify the components and hardware. Do not remove the hardware of components from the envelopes until they are recognized and can be kept sorted for easy access later. Check all switches carefully (against Figure 5) for correct length and position of contacts prior to mounting.

A nominal list of tools for kit assembly should include a good soldering iron, screwdrivers, a knife, long nose pliers, diagonal cutters, a 5/16" and 1/4" Spintite type wrench, a ruler, a 1/2" and 9/16" wrench and a soldering aid probe tool. Use good rosin core solder and keep the soldering iron hot and clean to assure good solder connections.

REMEMBER that HIGH VOLTAGES appear at several places on the assembled chassis during the testing operation.

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Viking Ranger Assembly Details

- A. SOCKET, TERMINAL STRIP AND SMALL PART ATTACHMENT. Refer to Figure 1. (Temporary legs are attached in Part F. Do not attach any at this time.)
1. (✓) Mount the 7 pin miniature socket, X6, oriented as shown in Figure 1A. Secure tightly at each mounting hole with the following hardware, starting from the top of the chassis: 1/4" 4-40 screwhead, chassis, #4 shakeproof washer, socket saddle foot, #6 teardrop terminal (one designated, Td), 4-40 nut.
 2. (✓) Mount the four 9 pin miniature sockets, X3, X4, X7 and X8, oriented as shown. Secure each socket tightly with the same hardware and sequence given in step 1. No teardrops are used. The holes in the 9 pin sockets have little clearance for the 4-40 screws. Insert the screw through the chassis, put on the shakeproof and then turn the screw into the saddle hole. When the saddle is pulled against the shakeproof, apply the nut and continue to turn the screw until the nut is pulled up tightly against the saddle foot. Bend the saddle terminal ears away from the socket approximately 45°.
 3. (✓) Mount four 8 pin octal sockets (set the 9 pin octal style socket aside at this time) X9, X10, X11 and X12, oriented as shown. Secure tightly with the following hardware at each mounting hole, starting from the top of the chassis: 1/4" 6-32 binding type screwhead, #6 shakeproof (only where teardrops are shown), chassis, socket saddle, #6 teardrop (where shown), #6 shakeproof, 6-32 nut.
 4. (✓) Mount another 8 pin octal socket, X5, as in step 3, with the exceptions that a 2 point terminal strip, X30, is mounted between the shakeproof and nut at the front mounting screw as shown, and a shakeproof is placed under the front screwhead.
 5. (✓) Secure a #6 teardrop at each of the two holes provided behind and to the left of X5 (viewed from the bottom). Use the following sequence at each hole, inserting the screw from the top: 1/4" 6-32 binding type screwhead chassis, #6 shakeproof, #6 teardrop, 6-32 nut.
 6. (✓) Secure a #10 teardrop (large size) directly to the left of X5 (viewed from the bottom). Use the following hardware sequence, inserting the screw from the top: 1/4" 6-32 binding type screwhead, chassis, #8 shakeproof, #10 teardrop (oriented as in Figure 1A), #8 shakeproof, 6-32 nut.
 7. (✓) Attach two #6 teardrops at the hole near the grommet and J5 holes shown in the upper right corner of Figure 1. Insert a 1/4" 4-40 screw at the rear, place a #4 shakeproof over the screw on the inside of the chassis, place two #6 teardrops over the screw and secure tightly as shown with a 4-40 nut.
 8. (✓) Mount three 4-terminal strips, X15, X16 and X20 as shown. Secure tightly with the following hardware, starting from the top of the chassis: 1/4" 4-40 round screwhead, #4 shakeproof (only where teardrops are shown), chassis, terminal strip foot (or feet), #6 teardrop (where shown), #4 shakeproof, 4-40 nut.
 9. (✓) Mount the three 3-terminal strips, X24, X25 and X26. Secure as in step 5.

- A. 10. (✓) Mount the six 5 terminal strips, X18, X19, X21, X23, X28 and X29. Secure as in step 5. Mount X18 first.
11. (✓) a. (✓) Mount X17, a 6-terminal strip. Secure as in step 5.
b. (✓) Mount X22, a 7-terminal strip, on the top of the chassis. Secure as in step 5.
c. (✓) Mount X34, a 8-terminal strip, below chassis. Secure as in step 5.
12. (✓) Place the six 9/16" OD rubber grommets in the holes designated W10 in Figure 1A.
13. (✓) Place the one 11/32" OD rubber grommet in hole designated W11.
14. (✓) Mount the key jack, J2, as shown. Place a 3/8" shakeproof over the jack threaded bushing before inserting the bushing into the chassis. Secure tightly with a 3/8" nut.
15. (✓) Mount the microphone receptacle, J1, as shown. Pin 2 should be toward the side of the chassis. Insert the 5/8" (terminal end) threaded bushing from the outside. Secure with the following hardware at the inside of the chassis: 5/8" shakeproof, 5/8" nut.
16. (✓) Insert the 3/8" 8-32 round head screw, Gd, at the inside of the chassis and secure it with a #8 shakeproof and an 8-32 nut on the outside of the chassis.
17. (✓) Mount the 83-1R, coaxial receptacle, J3, as shown. Secure tightly with the following hardware at each hole, starting from the outside of the chassis: 3/8" 4-40 round screwhead, #4 shakeproof, chassis wall, 83-1R flange, #4 shakeproof, #6 teardrop (where shown), 4-40 nut.
18. (✓) Attach #6 teardrop near J1 using following hardware sequence from outside of chassis: 1/4" 4-40 screwhead, chassis, #4 shakeproof, #6 teardrop, oriented as shown, 4-40 nut.
19. (✓) Mount the ceramic 2-terminal jack, J5, as shown. Insert the 3/8" 4-40 screw from the rear and secure it tightly with a #4 shakeproof and a 4-40 nut on the inside of the chassis.
20. (✓) Mount R21, the small 1 megohm audio control Part #22.832 as shown. Place a 3/8" shakeproof over the control bushing before inserting the bushing into the chassis hole. Secure tightly on the outside of the chassis with a 3/8" -32 nut.
21. (✓) Mount the three 2 15/16" 6-32 tapped aluminum spacers, D36, 37, 38, using 1/4" 6-32 binding head screws and #6 shakeproof washers as shown in Figure 4A.
22. (✓) Mount R13, the large 25K drive control Part #22.732 as shown. Secure as in step 20.
23. (✓) Mount the small, single phenolic wafer switch, SW2 as shown. Note that the rotor is in the maximum clockwise as viewed from the rear. Check the wafer orientation with Figure 1A. Secure as in step 20.
24. (✓) Mount the 8 pin octal crystal socket, X14, as shown, in the following steps:
a. (✓) Attach 1 3/8" x 1/4" round spacers loosely to the topside of the octal socket plate with 1/4" 6-32 binding head screws.

- A. 24. b. (✓) Hold the socket in position and attach the other ends of the spacer rods to the inside of the chassis with 1/4" 6-32 binding head screw.
- c. (✓) Center the socket on the 1 1/2" chassis hole and tighten all screws securely.
- B. BOTTOMSIDE CHASSIS GROUND CONNECTIONS. Use #20 tinned wire, obtained by stripping the black hookup wire, on all connections in this part. Refer to Figure 1A and Figure 4B.
1. (✓) Connect the center socket shield and pin 5 to the ground terminal ear near pin 6 and connect pin 7 to the center shield on the 9 pin miniature sockets, X3 and X4.
 2. (✓) Connect the center socket shield to pin 9 and connect pin 9 to the ground terminal ear near pin 9 on the 9 pin miniature socket, X7.
 3. (✓) Connect pin 4 to the center socket shield, the center shield to pin 5 and pin 5 to the ground terminal ear near pin 6 on the 9 pin miniature socket, X8.
 4. (✓) Connect pin 2 to the center socket shield, the center shield to pin 3 and pin 3 to the nearby teardrop on the 7 pin miniature socket, X6.
 5. (✓) Connect pin 1 to pin 2 and pin 2 to the nearby teardrop on the 8 pin octal sockets, X9 and X10.
 6. (✓) Connect pin 2 to the nearby teardrop on the 8 pin octal socket, X12.
- C. RF SECTION HARNESS INSTALLATION. Refer to Figure 2. All leads have been cut to length and stripped.
1. (✓) Train the harness into position as shown. Separate five leads, 46B, 34B, 30B, 39A and 35B, at the bend of the harness, and push all but the separated five through the rectangular cutout. Bend the leads over the inner front corner of the cutout to hold the harness in place.
 2. (✓) Separate three leads, 40B, 42B and 43B, at the end of the harness near X19, and carefully push all but the three separated leads through the W10 grommet.
 3. (✓) Make the harness connections on the bottom side of the chassis as indicated in Figure 2, with the exception of SW4 and SW5 leads which will be connected later. Train each lead near the harness or the chassis surface directly to the indicated terminal. A slight excess on any lead may be taken up with a slow U bend on the lead near the terminal. Hook the stripped lead ends into the terminals but do not solder at this time.
- D. AUDIO SECTION HARNESS INSTALLATION. Refer to Figure 3A. All leads have been cut to length and stripped.
1. (✓) Train the harness into position as shown.
 2. (✓) Push lead 12B, near X19, through the W10 grommet with the leads from the other harness.
 3. (✓) Make the audio section harness connections as indicated in Figure 3A, in

- D. 3. the same manner as the RF section harness, with the exception of the shielded lead #13. Solder terminal 2 of X23.
4. () Make the shielded lead, 13B, connections in the following steps:
- () Cut a 2 3/4" length from the end of 13B and save for a later connection.
 - () Cut another 3/4" length from the end of 13B, slip the shield braid off the insulation and place the 3/4" shield over the 1 megohm, 1/2 watt resistor, R17.
 - () Make certain 13B is brought out from the underside of the harness toward X7. Then lay the remaining 13B lead over pin 2 of X7 and cut off any excess 1/4" beyond the pin.
 - () Remove 1/2" of braid and 3/8" of insulation from the end of 13B.
 - () Place the braid covered resistor, R17, along 13B as shown in Figure 3B. Loop a 1 1/2" piece of #20 wire around the ends of the braid of R17 and 13B. Solder the loop to the shield braids. Pull the braid over the lead on the opposite end of R17, solder the braid to the lead and loop the lead around the 13B braid as shown in Figure 3B to hold R17 in place. Solder the loop and cut the excess lead wire.
 - () Hook the inner conductor of 13B over the lead of R17 near the resistor body. Solder quickly but thoroughly. Cut the R17 lead to 1/4" length and connect it to pin 2 of X7.
 - () Connect the grounding wire of R17-13B to the ground ear near pin 3 of X7, making the lead as short as possible.
 - () Solder the connections of f and g.
5. () Prepare 13A lead as follows: Refer to Figures 3C and 3D.
- () Push back the shield 3 or 4" on the lead and cut 3/4" of insulation and inner conductor off 13A.
 - () Strip 3/16" of insulation off the end of 13A.
 - () Cut one lead of R16, a 4700 1/2 watt resistor to 1/4" length and the other to 3/8" length.
 - () Lay the 1/4" lead of R16 against the 3/16" inner conductor of 13A and solder the two together, allowing the solder to flow smoothly around both leads. Allow to cool.
 - () Cover the connection made in d with a 3/4" x 3/8" piece of friction or electrical plastic tape, keep the splice diameter as small as possible.
 - () Funnel the shield braid with a pencil or the tip of a long nose plier and work the braid over the splice and R16 until the braid extends nearly to the end of the body of R16. Loop one end of a 1 1/2" length of #20 wire around the braid near the end of R16 and solder the lead to the braid.
 - () Lay C58, a 300 mmfd (tan) mica condenser along the braid and connect it to R16 and braid as shown in Figure 3D. Solder both connections.
 - () Train lead 13A along the chassis toward and to the rear of X6, upward between terminals 2 and 3 of X26, straight to J1.
 - () Hook and solder the free end of R16 to contact #1 of J1 (the contact toward the middle of the chassis).
 - () Connect and solder the grounding lead to the teardrop near J1. Keep the lead as short as possible, clearing J1, and cut off any excess.
 - () Loop a 1 1/2" length of #20 tinned wire to the braid of lead 13 near the teardrop on X6. Solder the lead to the braid and solder the other end of the lead to the teardrop so that lead 13 is

- D. 5. k. kept away from X6 by at least $1/8$ " when it is in position against the chassis.
- E. TEMPORARY LEG ATTACHMENT, CONDENSER, SWITCH, AND RF CHOKE MOUNTING AND SWITCH CONNECTIONS. Refer to Figures 4 and 5. If the switches have $3/8$ " nuts and shake-proofs as they are received, remove the nuts before starting the hardware sequence.
1. (✓) Make up four mounting legs as shown in Figure 5F and attach them as shown in Figures 4A and 4B with the $1/2$ " 10-24 (or 10-32 if supplied) cadmium plated truss head sheet metal screw. Lubricate the screws and holes with vaseline or similar lubricant before self tapping the screws into the chassis.
 2. (✓) Mount the dual section final variable condenser, C8, in the following steps as shown in Figures 4A and 4B.
 - a. (✓) Plate a $7/16$ " OD fiber shoulder washer over each of the three mounting holes (shoulder in the hole), and place C8 in position over the washers.
 - b. (✓) Secure the condenser only at the end mounting feet with the following hardware sequence: $3/8$ " 6-32 round screwhead, #6 shake-proof washer, $7/16$ " OD fiber shoulder washer (shoulder away from the screwhead), chassis, fiber washer, condenser foot.
 3. (✓) Mount the large two wafer bandswitch, SW3, in position as shown in Figure 4B, in the following steps:
 - a. (✓) Place hardware over the shaft as listed below:
 - (1) ✓ $3/8$ " shakeproof
 - (2) ✓ $1\ 3/4$ " long, $1\ 1/2$ " wide L bracket, with the bracket foot toward the switch wafers.
 - (3) ✓ $3/8$ -32 nut.
 - (4) ✓ VFO bandswitch drive arm, D1, with the $1/8$ " pegs toward the switch wafer. Do not put in set screws at this time.
 - (5) ✓ A $3/8$ " threaded panel bushing over the shaft with the hex end toward the switch wafer.
 - (6) ✓ $3/8$ " shakeproof.
 - b. (✓) Push the threaded bushing into the front chassis hole and secure it with a $3/8$ " -32 nut.
 - c. (✓) Hold the switch and brackets in position shown in Figure 4B and loosely secure the bracket between the wafers to the chassis at each of the mounting holes with the following hardware sequence: $1/4$ " 6-32 binding screw inserted at the top of the chassis, chassis, bracket, #6 shakeproof, 6-32 nut.
 - d. (✓) Secure the front bracket to the switch bushing with the $3/8$ "-32 nut, and loosely secure the bracket to the chassis with the same hardware used on the rear bracket. Push the switch toward the rear of the chassis and tighten all chassis-bracket screws securely.
 4. () Mount the front brackets, meter switch, operate switch and VFO bandswitch.
 - a. (✓) Attach the four $1\ 3/8$ " long by $5/8$ " wide L brackets, BKT3-6, at the top front edge of the chassis as shown in Figure 4A. Orient the bends toward the front and secure each with the following sequence: $3/8$ " 8-32 round head screw inserted from the top, bracket foot, chassis, #8 shakeproof, #10 teardrop (only on BKT3 which supports SW5), 8-32 nut. The L brackets should be flush with front of chassis.
 - b. (✓) Attach $3/8$ "-32 threaded panel bushings to the middle brackets, inserting them from the rear, and securing each with the following hardware sequence: hex bushing shoulder, $3/8$ " teardrop, bracket,

- E. 4.
- b. $\frac{3}{8}$ " nut. Bend each teardrop back over the hex bushing to the $\frac{1}{4}$ " bearing so that the end of the teardrop will contact the shaft which will be installed later.
 - c. (✓) Mount SW5, the small phenolic wafer meter switch as shown in Figure 5A with shakeproof between the bushing shoulder and the bracket. Secure with a $\frac{3}{8}$ "-32 nut.
 - d. (✓) Mount SW4, the double steatite wafer switch, as shown in Figure 5B in the same way as SW5 was mounted. Bend the double contact fingers of clip 9 of the rear wafer SW4B so that they break off cleanly next to the rivet. Clip 9 will be used as a terminal point only.
 - e. (✓) Mount SW1, the small single steatite wafer switch, on top of the chassis in position as shown in Figure 5C. Place a shakeproof between the bushing shoulder and the chassis. Secure with a $\frac{3}{8}$ "-32 nut.
5. (✓) Mount the high frequency buffer coil, L6B, on the bottom side of the chassis. Orient in position as shown in Figure 4B. Form the #14 lead (continuation of the winding) to allow it to pass through the $\frac{7}{16}$ " hole at the rear of L6B. Secure L6B at each insulator with a $\frac{1}{4}$ " 6-32 binding head screw and a #6 shakeproof (against screw head).
6. (✓) Mount C7, the buffer variable condenser in position as shown in Figure 4A. Space and secure the condenser at each foot with the following sequence: $\frac{1}{4}$ " 6-32 binding head screw inserted from the bottom, #6 shakeproof, chassis, two #8 flatwashers, condenser foot. Mount X39, a 2-terminal strip, near X4 on the front mounting screw of C7 with the insulated terminal toward X4.
7. (✓) Make up and attach the final coil mounting stud at the hole near the rear mounting foot of the final condenser as shown. Place a 2 $\frac{1}{2}$ " 6-32 screw through the hole from the bottom, place a 2 $\frac{1}{6}$ " long $\frac{1}{4}$ " dia. aluminum spacer, D35, over the screw and secure it with a #6 shakeproof and 6-32 nut.
8. (✓) Mount R15, a 30,000 ohm, 20 watt fixed screen dropping resistor below the chassis and the two point terminal strip, X31, above the chassis. Use a 2 $\frac{1}{2}$ " 6-32 screw, inserting it from the top with the following hardware and part sequence: screwhead, terminal strip foot, chassis, $\frac{7}{16}$ " OD fiber shoulder washer, R15, $\frac{7}{16}$ " OD fiber shoulder washer, R15, $\frac{7}{16}$ " OD fiber shoulder washer - #6 shakeproof, 6-32 nut.
9. () Attach the VFO switch driver arm and cam, D1 and D2, as directed in the following steps:
- a. () Attach and tighten the 1 $\frac{5}{8}$ " dial knob to the SW3 shaft with a $\frac{3}{16}$ " #10 setscrew.
 - b. () Push the VFO bandswitch drive arm, D1, toward the front of the chassis. Turn the VFO bandswitch, SW1, shaft to the middle (40 meter) position with a plier and the main bandswitch, SW3, shaft to the second position away from the counter-clockwise position (viewed from the front).
 - c. () Attach the drive cam, D2, to the end of the VFO switch shaft with a $\frac{3}{16}$ " 10-32 setscrew in the position shown in Figure 4B. Tighten the setscrew enough so that SW1 can be turned with D1.
 - d. () Orient the drive arm, D1, with the $\frac{1}{8}$ " dia. pins on the chassis side of the shaft, start two $\frac{3}{16}$ " #8 setscrews in the hub, and push D1 toward D2 until the rear surface of D1 (surface toward

- E. 9. d. D2) is just 5/16" from the front edge of D2. Rotate D1 counter-clockwise (viewed from the front) in the 5/16" position until the left drive arm pin moves downward against the middle incline of D2. Back off so that the pin clears the incline by 1/64" to 1/32" and tighten the setscrews of D1 to hold it securely in position.
- e. () Turn SW3 again to the counter-clockwise position (viewed from the front) and SW1 to the most counter-clockwise position (viewed looking into the bottom of the chassis).
- f. () Test SW3 and SW1 action by turning the SW3 knob clockwise. As SW3 is turned from the counter-clockwise position the band positions progress as follows: 160, 80, 40, 20, 15, 10 and 11. The VFO switch should turn 30° between the 80 and 40 meter positions and between the 10 and 11 meter position as the bandswitch knob is turned in either direction.
10. () Make necessary minor adjustments for good action and set the setscrews in place by loosening them slightly and retightening them very tightly. Figure 4B shows the switch cam-drive arm assembly as it should normally be in the 40 meter position. Although not necessary, a slight film of vaseline or similar lubricant will help to reduce friction.
11. () Make up the 3/8" coil fastener and core assembly for the oscillator coil, L5, as shown in Figure 1B. Push the four nut core into, and the fastener over the long unwound end of the 3/8" phenolic form of the coil, L5 as far as possible.
12. () Orient the coil so that the terminals project as shown in Figure 1A and push the coil fastener hard into the chassis hole until the fastener tabs snap out on the topside of the chassis, holding the coil in place.
13. () Mount the 3 pi RF choke L10, as shown in Figure 4A, with the terminals toward the front of chassis. Use the following hardware sequence starting from bottom of chassis: 3/8" 6-32 round head screw, #6 shakeproof, chassis, choke.

F. POINT TO POINT CONNECTIONS

1. () Cut to length, strip 5/16" at each end, and make point to point connections with the plastic hookup wire as follows:
- a. () green, 4" long, pin 7 of X9 to pin 7 of X10.
- b. () green, 5" long, pin 7 of X10 to pin 4 of X6.
- c. () black, 4" long, pin 8 of X9 to pin 8 of X10.
- d. () green, 5" long, terminal 5 of X17 to pin 2 of X5.
- e. () black, 4 1/4" long, terminal 1 of X17 along the chassis to vicinity of R15 then directly to the terminal of R15 away from the chassis.
- f. () black, 4 1/4" long, to the terminal of R15 away from the chassis, through the W11 grommet, to the ungrounded terminal of the 2-terminal strip, X31, on the topside of the chassis.
- g. () yellow, 4" long, pin 6 of X9 to pin 6 of X10.
- h. () green, 3" long, terminal 4 of X22 through grommet W10 next to X22 to terminal 5 of X34.
- i. () black 3/4" long, terminal 7 of X22 through grommet W10 next to X22 to terminal 4 of X34.
- j. () yellow, 3 1/2" long, terminal 2 of X22 to terminal 1 of X34.
- k. () black, 5 3/4" long, terminal 6 of X34 to clip 11 of SW2.
- l. () black, 6" long, terminal 3 of X15 to clip 10 of SW2.
- m. () black, 2 1/2" long, clip 12 of SW2 to the terminal of the drive control, R13, which is nearest the chassis lip (the most ccw of

F. 1.

- m. (✓) the three when R13 is viewed from the rear).
- n. (✓) black, 4 1/2" long, clip 12 of SW2 to the nearest grounding ear on the mounting saddle of X3 (near pin 8).
- o. (✓) yellow, 4 3/4" long, pin 9 of X3 to clip 4 of SW2. Connect clip 3 to clip 4 with tinned wire.
- p. (✓) black, 2 1/2" long, pin 5 of X14 to clip 1 of SW2.
- q. (✓) black, 3 1/2" long, pin 7 of X14 to clip 2 of SW2.
- r. (✓) black, 2" long, strip completely, ground pins 1 and 3 of X14 to the grounding ear just below X14 on the mounting saddle of X3 (near pin 1).
- s. (✓) green, 4" long, pin 4 of X3 to terminal 2 of X34.
- t. (✓) red, 4 3/4" long, terminal 6 of X22 to clip 12 of SW3A (front of the front deck).
- u. (✓) Cut a 3 1/2" orange lead, strip 1/4" each end connect between terminal 1 of X22 and terminal 8 of X34. Do not solder.
- v. (✓) Blue, 3 1/2" long, terminal near the chassis on the Oscillator coil, L5, to pin 6 of X3.
- w. (✓) Connect a 4 7/8" yellow lead stripped 5/16" and 1/2" between terminals 3 of X34 and clips 5 and 6 of SW2, the 1/2" end connecting clips 5 and 6. Train the lead under the harness.
- x. () Three leads, 6 1/2" red, 4 1/2" blue and 5 1/2" yellow, placed together with one end of each even with the one end of the others, twist together three complete turns and make the following connections:
1. () The long red extension, at the uneven length end of the twisted group, to terminal 1 of X15 (pass the lead under the harness).
 2. () The yellow lead, at the uneven length end of the twisted group to the terminal farthest from the chassis on L5. Crimp but do not solder.
 3. () The blue lead of the twisted group to the middle terminal of L5, solder.
 4. () Train the twisted group along the chassis to SW3A, and untwist the ends only enough to make the connections of the next step neatly.
 5. (✓) Connect red to clip 12, blue to clip 11 and yellow to clip 10 of SW3A.
 6. (✓) Train the twisted group against the chassis and bring the lead ends from the terminals and SW3 toward the chassis as directly as possible.
 7. (✓) Connect R10, 33,000 ohm 1/2 watt resistor, 7/8" leads, between the outer terminals of L5. Solder the terminal away from the chassis.
- y. (✓) Red, 1 3/4" long, jumper clip 8 to clip 12 of SW3A.
- z. () Shielded lead, 2 3/4" long, saved from step C4. Make up the lead as shown in Figure 3E and make the following connections:
1. (✓) The inner conductor of one end of pin 7 of X7 and the shield lead of that end to the ground ear near pin 9 of X7.
 2. (✓) The inner conductor of the other end to the middle terminal of the audio control. R21, and the shield lead through the terminal nearest the chassis (ccw viewed from the rear), then to the #10 teardrop on the chassis.
 3. (✓) Solder both connections at X7 and the middle terminal of R21.
- aa. (✓) Black, 3 3/4" long, clip 6 of SW1 to terminal 3 of X22 on the top-side. Solder at clip 6.

- F. 1. bb. (✓) Make the harness connections to SW5, the meter switch. Refer to Figure 3A (lead 12B) and Figure 2 for lead connections, and to Figure 5A for switch clip locations. Pass the leads between the front surface of the wafer and the index.
- cc. () Make the following additional connections to SW5:
1. (✓) A 4" black lead, from clip 11 of SW5, through the grommet (with the other meter leads) to the teardrop at the front foot of X19.
 2. (✓) A 1 1/2" black jumper, between clip 11 and 3 of SW5.
 3. (✓) A 2 3/4" red lead to clip 12 of SW5. The free end will be connected later.
 4. (✓) A 4" black lead to clip 6 of SW5. The free end will be connected later.
 5. (✓) A 2" black lead between clip 3 and clip 7 of SW5.
- dd. (✓) Solder all clip terminals on SW5.
- ee. (✓) Make the harness connections to SW4, the Operate switch. Refer to Figure 2 for lead connections and to Figure 5B for switch clip locations. Connect the short leads first.
- ff. () Make the following pilot light leads with green wire, training the leads as indicated in Figure 11:
1. (✓) 11" length between clip 3 of SW4B and the insulated terminal of X32. Solder SW4B.
 2. () 10" length between the insulated terminal of X32 and the insulated terminal of X33. Do not solder.
 3. (✓) 11" length between clip 4 of SW4B and bracket type socket assembly I4. Solder both ends and place the I4 assembly below X33 until it is mounted later.
- gg. () Make the following additional connections to SW4:
1. (✓) A 1 1/8" black jumper between clips 3 and 5 of SW4A.
 2. (✓) A 3/4" tinned #20 jumper between clips 9 and 10 of SW4A.
 3. (✓) A 3 1/4" green lead between pin 7 of X12 and clip 5 of SW4B.
 4. (✓) A 2 1/8" black lead between clips 7 and 12 of SW4A.
 5. (✓) A 1 1/8" black jumper between pins 3 and 5 of SW4B.
 6. (✓) SH4, .51 ohm, large 1/2 watt resistor, 1/2" leads between clips 9 and 12 of SW4B.
 7. (✓) A 1 1/2" black lead between clip 7 of SW4A and the teardrop on the front foot of X15.
 8. (✓) Solder all clip terminals on SW4A and SW4B.

G. VFO ASSEMBLY, MOUNTING AND CONNECTIONS

1. (✓) Orient the phenolic plate, CH10, as shown in Figure 6A. Turn 9/16" 4-40 round head cadmium plated screws in the five holes designated A, B, C, D and E, self threading the plate as the screws are turned in. Turn A, B and C until the ends are flush with the opposite side of the plate and turn D and E until they project 1/4" beyond the opposite side of the plate.
2. () Secure two miniature 7 pin sockets, X1 and X2 on the subchassis plate, CH11, with 1/4" 4-40 round head screws, #4 shakeproofs, and 4-40 nuts as shown in Figure 6B, before mounting CH11 to CH10.
3. () Mount CH11 to CH10 as shown in Figure 6B with the following hardware at each of the two mounting holes, inserting the screws through the phenolic plate: 7/8" 6-32 round screw head, shakeproof (inner screw only), #6 teardrop (inner screw only), phenolic plate, 1/2" long cylindrical spacer, sub-chassis, #6 shakeproof, two #6 teardrops (on outer screw only), 6-32 nut.

- G. 4. () Place CH10 in position as shown in Figure 6A. Connect a 3" piece of #16 tinned wire to the teardrop between the tube sockets, loop the wire around terminal B and pass the free end through the hole near B and C.
5. () Connect C12, C13, C14, C15, 500 volt silvered mica condensers as shown in Figure 6A and as listed below:
- a. () C12, 500 mmf, between terminals A and D.
 - b. () C13, 500 mmf, between terminals B and D.
 - c. () C15, 1000 mmf, between terminals B and E.
 - d. () C14, 1000 mmf, between terminals C and E.
6. () Cut, strip ends 5/16", connect and solder the following leads as indicated:
- a. () Blue, 5 1/8" long, and a 2" tinned #20 (stripped black) to terminal A. Solder all leads on A.
 - b. () Red, 5 1/8" long, and a 2" tinned #20 (stripped black) to terminal C. Solder all connections on C.
 - c. () Pass the free end of the blue lead through the hole near D and the free end of the red lead through the hole near E.
7. () Solder all of the remaining unsoldered connections on the top side of CH10 except at B.
8. () Mount and secure the following miniature trimmer condensers to the phenolic board CH10 as shown in Figures 6A and 6B:
- a. () C2, a 15M11 with a left rotor terminal (viewed from rear with stator down).
 - b. () C3, a 30M8 with a right rotor terminal.
 - c. () C4, a 15M11 with a right rotor terminal. Place a #10 teardrop on each side of the phenolic board while mounting C4 (as shown in Figures 6A and 6B).
 - d. () C5, a 15M11 with a left rotor terminal. Place a #10 teardrop on the top side of the phenolic board while mounting C5 (as shown in Figure 6A).
 - e. () C6, a 30M8 with a right rotor terminal.
 - f. () Hook one end of a 3" piece of #16 tinned wire into the two #10 teardrops between C4 and C5. Connect the other end to terminal B. Solder both connections.
9. () Cut, strip ends 5/16", connect one end of the following leads as shown on Figure 6B and indicated below:
- a. () Green, 3 1/4" long, to the stator terminal of C3. Pass the free end through the large hole near C2 in the phenolic plate.
 - b. () Green, 2 3/4" long, to stator terminal of C3. Extend away from C3.
 - c. () Black, 3 1/4" long, to the stator terminal of C4.
 - d. () Yellow, 4 1/2" long, to terminal D on the phenolic board. Solder.
 - e. () Green 4" long to terminal E on the phenolic board. Solder.
 - f. () Yellow, 2 1/2" long, to the stator terminal of C6. Pass the free end through the hole in the phenolic plate near C6 rotor terminal.
10. () Secure four of the five 3/8" x 7/8" aluminum brackets, B8-B11, to the two section variable condenser, C1, mounting posts with 1/4" 6-32 binding head screws and #6 shakeproofs as shown in Figure 6B. Level the bracket feet on a flat surface while tightening the screws.
11. () Place C1 in position on the phenolic plate, CH10, and secure B8 and B10 to CH10 with 3/8" 6-32 screws, #6 shakeproofs, and 6-32 nuts. Do not secure B9 and B11 at this time.
12. () Make the following jumper connections with #20 tinned wire (stripped black) as directly as possible unless the training of the lead is specified:
- a. () 1 1/4" long, between C6 rotor and C1B stator terminals.
 - b. () 1" long, between C6 stator and C5 stator terminals.

- G. 12. c. () 1 1/4" long, between C5 rotor and C4 rotor terminals and the #10 teardrop by C4.
d. () 1 1/4" long, between C3 rotor and C1A stator terminals.
e. () 2" long, between C2 rotor and C1 rotor terminals. Run the lead directly from the C2 rotor terminal to the phenolic plate, along the phenolic plate to a position in line with the C1 rotor terminal, then with a right angle bend, directly to the C1 rotor terminal.
f. () 1 1/4" long, between C2 stator and C3 stator terminals.
13. () Cut one lead of C11, a 62 mmf. NPO tubular ceramic condenser (blk-blu-red-blk-or), to 5/8" length and the other to 3/8" length. Place the condenser as closely as possible to the position shown in Figure 6B. Connect the 3/8" lead to the stator terminal of C3 and the 5/8" lead to the stator terminal of C1A.
14. () Cut one lead of C17, a 140 mmf. NPO tubular ceramic condenser (blk-brn-yel-brn-or) to 3/4" length and the other lead to 3/8" length. Place C17 as closely as possible to the position shown in Figure 6B. Connect the 3/8" lead to the stator terminal of C6 and the 3/4" lead to the stator terminal of C1B.
15. () Connect the #16 tinned wire, extending through the hole between C2 and C1, to the rotor terminal of C1. Train the lead directly to the terminal and simply pass the end through the terminal. Solder and trim any excess 1/8" beyond this terminal.
16. () Solder all connections on the trimmer and dual variable condensers.
17. () Attach the four 2 1/8" and four 2 15/16" spacer rods at the corners of the phenolic plate, CH10, with the 5/8" 6-32 threaded studs. Place the 2 15/16" spacers on the bottom side of the phenolic plate, shown in Figure 6B, and the 2 1/8" spacers on the top side of the phenolic plate, shown in Figure 6A.
18. () Connect pins 2 and 3 and the center shield of X1 to one of the subchassis teardrops with a 2" piece of #20 tinned wire (stripped black).
19. () Connect and solder pin 7 of X2 to the second subchassis teardrop with an end of a 3 3/4" long #16 tinned lead, extending the excess lead beyond pin 7 of X2 for later ground connection when the VFO is mounted.
20. () Connect R1, 100,000 ohm 1/2 watt resistor, 1" leads, to pin 1 of X1. Train straight away from socket for future connection. Do not solder.
21. () Connect C19, a .005 mfd disc ceramic condenser, 1/2" leads, between pin 6 of X1 and the subchassis teardrop with the #20 wire previously connected.
22. () Connect a 1 1/4" blue lead between pin 6 of X1 and pin 5 of X2.
23. () Cut one lead of R3, the 18,000 ohm, 2 watt resistor to 3/8" length and the other lead to 3/4" length. Connect the 3/8" lead to pin 1 of X2. The 3/4" lead can be bent inward for later connection.
24. () Cut, strip ends 5/16", connect and solder one end of the following leads as indicated:
a. () Green, 2" long, to pin 4 of X1.

- G. 24. b. () Black, 2" long, to pin 7 of X1.
 c. () Red, 2 1/2" long, to pin 5 of X1.
25. () Solder all unsoldered pin terminals and center shields of X1 and X2 and the subchassis teardrop, with the exception of pin 1 of X1.
26. () Twist the blue and yellow leads (near C4) together two complete turns. Twist the red and green leads (near C5) together two complete turns.
27. () Attach the 2" 6-32 screws to the VFO coil L1 (shown in Figure 7A), with hardware in the following sequence at each end, inserting the screws on the side opposite the terminals: 2" screw head, #6 shakeproof, coil form walls, 7/16" OD fiber shoulder washer (shoulder toward the coil), 6-32 nut. Tighten the nuts securely but do not attempt to turn the nut as far as possible with a wrench or plier as the coil forms can be broken with such treatment. Place another nut on each screw to jam the securing nut.
28. () Turn another 6-32 nut on each L1 mounting screw until 5/16" of screw thread projects beyond the nut. Mount the coil on the topside of CH10 (shown in Figure 6A) in the holes above B9 and B11 (shown in Figure 6B). Orient the space wound coil toward the front of CH10 (over C12 and C13, the .0005 mfd mica condensers) and tightly secure each of the mounting screws and C1 brackets to CH10 with the following sequence: 6-32 nut at 5/16" from the screw end, #6 shakeproof, phenolic board, CH10, bracket foot, 6-32 nut.
29. () Make the following connections to L1:
- a. () The tinned #20 lead on terminal A to the front outer terminal of L1A, the space wound coil. Solder.
 - b. () The green lead coming through the hole near B to the rear terminal of L1A.
 - c. () The tinned #20 lead on terminal C to the front (inner) terminal of L1B, the close wound coil. Solder.
 - d. () The yellow lead coming through the hole near C6 to the outer terminal of L1B.
30. () Cut the leads of C10, the 47 mmf, N150 temperature coefficient, ceramic tubular condenser (OR-YEL-VLT-BLK-OR-or RD), to 5/8" and 1 1/8" lengths. Bend a right angle 3/16" from the end of each lead. Connect the short lead to the inner terminal of L1A (previously connected to a green lead) with the condenser toward the closewound coil and upward away from the VFO mounting plate. The long lead bent end is placed in the screwhead slot of terminal screw B and soldered. Solder both leads on the L1A terminal. Condenser C10 should be parallel to the axis of and spaced from L1 approximately 1/16".
31. () Cut the leads of C16, the 91 mmf, N080 temperature coefficient, ceramic tubular condenser (RD-WH-BRN-BLK-OR) to 5/8" and 1" lengths. Connect the 5/8" lead to the outer terminal of L1B (previously connected to the yellow lead). Orient C16 parallel axially with L1B and connect the 1" lead to the #16 ground but at a position between terminals D and E. (Refer to Figure 6A). Solder both C16 connections and the yellow lead on L1B.
32. () Make the following connections at the VFO terminal strip, X22, and the VFO bandswitch, SW1, on the top side of the transmitter chassis:
- a. () C20, .005 mfd ceramic disc condenser, 1/2" leads, between terminal 7 of X22 and the teardrop at the front mounting foot of X22.

G. 32.

- b. (✓) C21, .005 mfd ceramic disc condenser, 7/8" leads, between terminal 4 of X22 and the rear teardrop of X22.
- c. (✓) C26, .005 mfd ceramic disc condenser, 1 1/8" leads, between terminal 5 and rear teardrop of X22.
- d. (✓) R5, 470 ohm, 1/2 watt resistor between terminals 5 and 6 of X22.
- e. (✓) R6, 22,000 ohm 1/2 watt resistor, leads 3/4" between terminals 2 and 5 of X22.
- f. (✓) L3, the 4 pi, 2.5 mh RF choke, 5/8" leads between terminal 3 and 7 of X22. Solder terminal 7 only.
- g. (✓) L2, the smallest single pi (colored green if coated), 52 micro H, RF choke, 1 1/4" leads between terminal 2 of X22 and clip 9 of SW1. Train L2 just above SW1 to X22.
- h. (✓) A 3 1/4" black jumper between terminal 5 of X22 and clip 10 of SW1.
- i. (✓) A 1" black jumper between clips 10 and 8 of SW1. Solder terminal 5 of X22 and clip 8 of SW1.
- j. (✓) R4, 1,500 ohm 1 watt resistor, 5/8" leads between clips 9 and 10 of SW1. Solder both connections.
- k. () Connect C86, 500 mmf molded mica condenser, 3/4" leads, between terminal 1 of X22 and ground lug at mounting foot nearer terminal 1. Solder at ground lug only.

33. () Mount the VFO in position as shown in Figure 7A and secure it to the chassis with four 1/4" 6-32 binding head screws and #6 shakeproofs between the screw heads and the bottom side of the chassis. Connect and solder the free ends of the VFO twisted leads to SW1 as follows, releasing the twisted pairs only enough to reach the clips.

- a. (✓) Yellow (twisted) to clip 7.
- b. (✓) Blue (twisted) to clip 3.
- c. (✓) Green (twisted) to clip 5.
- d. (✓) Red (twisted) to clip 1.
- e. (✓) Black (from C4) to clip 11.
- f. (✓) Connect the 2 3/4" green lead from stator terminal of C3 (in the left rear corner viewed from the top and front) to clip 12 of SW1.
- g. () Cut the leads of C18, a 43 mmfd NPO tubular ceramic condenser (blk-yel-or-blk-or), to 3/8" and 1" lengths. Cut the leads of R2, a 56 ohm 1/2 watt resistor, to 3/8" and 3/4" lengths. Form hooks, crimp the 3/8" leads of C18 and R2 together, and solder the connection. Connect the free lead of C18 to clip 2 of SW1 and the free lead of R2 to pin 1 of X1. Take up slack on the lead of R2 at X1 so that the R2-C18 combination is trained as directly as possible between X1 and SW1 without tension on the leads. Solder all leads at the clip and pin.

34. () Connect and solder the leads from X1 and X2 to X22 as follows:

- a. (✓) R3, the 18,000 ohm 2 watt resistor to terminal 6 of X22.
- b. (✓) Red to terminal 2 of X22.
- c. (✓) Black to terminal 3 of X22.
- d. (✓) Green to terminal 4 of X22.
- e. (✓) #16 tinned lead to the front teardrop of X22.
- f. () Connect and solder the remaining lead of R1, 100,000 ohm 1/2 watt resistor to terminal 1 of X22.

35. () Make certain all VFO and X22 terminal teardrop connections are soldered. Train all leads for at least 1/16" to 1/8" clearance to all components (particularly C1) and other leads.

H. RF EXCITER COMPONENT CONNECTIONS. Refer to Figures 7B and 11.

1. () Make the following connections in the vicinity of X34, X3, X15, and X14.
 - a. () L15, largest of the single pi RF chokes (black) 7/8" leads between terminals 2 and 5 of X34.
 - b. () L16, middle size of single pi RF chokes (red if coated), 7/8" leads, terminals 4 and 6 of X34.
 - c. () C22, 300 mmf small mica condenser (tan or red), 1/2" leads between terminals 1 and 3 of X34.
 - d. () R7, 100,000 ohm 1/2 watt resistor, 3/4" leads, between pin 9 of X3 and terminal 7 of X34.
 - e. () C87, .005 mfd disc ceramic condenser, 3/4" leads, terminal 7 of X34 and ground lug on front mounting foot of X34. Solder all connections and ground lug on X34 except terminals 7 and 8.
 - f. () C27, .005 mfd disc ceramic condenser, 3/8" leads, between pins 7 and 8 of X3.
 - g. () C25, .005 mfd ceramic condenser, 3/8" leads, between pins 4 and 5 of X3.
 - h. () C23, 25 mmfd, silvered mica condenser (ruby), 1" leads, between pin 9 of X3 and clip 7 of the Xtal VFO switch SW2.
 - i. () R8, 68,000 ohms 1/2 watt resistor, 1/2" and 1 1/4" leads, between pin 3 of X3 and terminal 1 of X15. Place the 1 1/4" lead through terminal 1 to terminal 2 and connect the end to terminal 2.
 - j. () Solder all unsoldered leads on SW2, X14, R13 and all pins, ground ears, and center shield on X3, with the exception of pin 1.
 - k. () SH1, 3 ohm, large 1/2 watt resistor, 5/8" leads, between terminal 4 of X15 and teardrop on front mounting foot of X15.
 - l. () C30, .005 mfd disc ceramic condenser, 1/2" leads, between terminal 4 of X15 and the front teardrop on X15.
 - m. () Cut the leads of C24, a 200 mmf small mica condenser (tan) to 1/2" length. Connect and solder C24 across the leads of L4, a 4 pi RF choke, spacing the flat side of C24 1/8" from the pies of L4.
 - n. () L4-C24 combination, leads 3/4" (from form), between pin 1 of X3 and terminal 4 of X15. Solder both leads.
2. () Make the following connections in the vicinity of X4 and X16:
 - a. () C31, .005 mfd disc ceramic condenser, 3/8" leads, between pins 4 and 5 of X4.
 - b. () C34, .005 mfd disc ceramic condenser, 1/2" leads between pin 1 and the ground ear near pin 3 of X4.
 - c. () C33, .005 mfd disc ceramic condenser, 3/8" leads, between pins 7 and 8 of X4.
 - d. () R11, 100,000 ohm, 1/2 watt resistor, one lead 3/4" other lead 3/8" between pin 9 of X4 and the insulated terminal of X39. Connect C88, .005 disc ceramic capacitor, 1/2" leads, between terminals of X39. Solder ground terminals only.
 - e. () C29, 50 mmfd small molded mica condenser (tan or possibly red) 1" leads, between the terminals of L5 nearest the chassis and pin 9 of X4. Place C29 on edge against the chassis.
 - f. () SH2, 3 ohm, large 1/2 watt resistor, 3/4" leads, between pin 1 of X4 and terminal 1 of X16.
 - g. () R12, 470 ohm 1/2 watt resistor, 5/8" leads, between terminals 1 and 3 of X16.
 - h. () Black lead, 2 3/4", between pin 6 of X4 and the end of the high-frequency buffer coil, L6B, near X4, just above the top supporting teardrop.

- H. 2. i. (✓) Solder all connections made in part 2 with the exception of terminal 2 of X39, but including the terminal near the chassis on L5, the center shield and ground jumpers of X4 and the teardrop at the front of X15.
3. (✓) Attach the mounting lugs to L6A, the low frequency buffer coil (1" form, #24 tapped winding) with the following hardware sequence: 1 3/8" 6-32 round screwhead (screw inserted from the terminal side), #6 spade lug, 7/16" OD fiber shoulder washer (shoulder toward coil form), coil form walls, 7/16" OD fiber shoulder washer (shoulder toward coil form), #6 spade lug, #6 shakeproof, 6-32 nut. Orient the threaded part of the spade lugs directly away from the coil form and tighten the 6-32 nut securely, taking care not to exert too much torque as the coil form can be broken.
4. () Attach the mounting lugs on L11B, the auxiliary 160 meter coil (1" form, #18 spaced winding) with the sequence as in 2 but orienting the coil so that the terminals are just to the left of the 1 3/8" 6-32 screwhead when the spade lugs are down and coil is viewed from the terminal side. Set the coil aside for later mounting.
5. () Connect and solder leads to the taps and mount L6A, the low frequency buffer coil as follows:
- (✓) Green, 3 3/4" length, to the bottom terminal, train this lead and the following leads directly toward the spade lug end of L6A.
 - (✓) Red, 4", to the first tap from the bottom.
 - (✓) Yellow, 3 3/4", to the second tap from the bottom.
 - () Blue, 3 1/2", to the third tap from the bottom.
 - () Black, 5", to the top terminal.
 - () Mount L6A on the topside of the chassis in position as shown in Figure 11. Place the leads through the rear grommet while putting the coil in position and train the leads toward the rear terminals of the front bandswitch wafer SW3A.
 - () Secure L6A with a #6 shakeproof and a 6-32 nut at the rear lug, and a #6 shakeproof (next to the chassis), a #6 teardrop (away from SW3), and a 6-32 nut at the front lug.
6. () Make the following connections to the front bandswitch wafer, SW3A, (refer to Figure 5E for clip numbering and Figure 7B for component location):
- () R9, 4700 ohm, 1 watt resistor, 5/8" and 1 1/4" leads, between clips 10 and 8 of SW3A. Orient just to the front of the clips, place the 1 1/4" lead through 10 and connect clip 9 to clip 10 with the extension.
 - (✓) L12, middle sized, single pi RF choke (red if coated), leads 1/2" and 1 1/4", between clip 12 (front) and 1 (rear). Connect the 1 1/4" lead to clip 12 and orient the choke near clip 1.
 - () C28, .005 mfd disc ceramic condenser, 3/8" leads, between clip 12 (front) and the teardrop at the front lug of L6A. Solder the teardrop.
 - () C36, .005 mfd disc ceramic condenser, 5/8" leads, connect one lead to clip 1 (rear) and the other lead to a #6 teardrop (loose) for later mounting. Solder the loose teardrop.
 - (✓) Black lead from L6A to clip 1. ✓
 - (✓) Blue lead from L6A to clip 2. ✓
 - (✓) Yellow lead from L6A to clip 3. ✓
 - (✓) Red lead from L6A to clip 4. ✓
 - (✓) Green lead from L6A to clip 5. ✓
- SW3A*
- teardrop*
- L6A*
- VFO CAN*

- H. 6. j. () #20 lead from the end of L6B (high frequency buffer coil) near SW3A to clip 5. Train as directly as possible bending only enough to clear the switch shaft by 1/8".
- k. () #20 tapped lead on L6B to clip 6. Bend enough to clear the switch shaft support rod.
- l. () Solder all connections on SW3A.
7. () Connect the #14 lead from L6B to the rear stator terminal of C7. Train the lead to the center of the chassis hole, push the end through the stator terminal and solder at the terminal.
8. () Connect C35, a 10 mmf silvered mica condenser (ruby), 3/8" and 7/8" leads to the free stator terminal and the rotor terminal of C7. Connect the 3/8" lead to the rotor.
9. () Connect a 4 1/4" black lead between the rotor terminal of C7 and the grounding ear near pin 1 of X4 on the bottomside of the chassis. Pass this lead through the hole through which the hot lead of L6B passes, training it near the chassis, away from the hot lead. Solder both unsoldered terminals of C7 and the grounding connection on X4.

I. AUDIO SECTION COMPONENT MOUNTING AND CONNECTIONS. Refer to Figure 8A and Figure 11 for component identification and to Figure 1A for terminal identification.

1. () Mount the modulation transformer, T2, and the 10 mfd electrolytic cathode bypass condensers, C50 and C59, as follows:
- a. () Cut the modulation transformer, T2, leads to the lengths listed below (unless it is supplied near the lengths given). Strip 3/8" and tin the ends.
1. () Red - 5 1/4".
 2. () Blue - 5 3/4".
 3. () Brown - 5 1/4".
 4. () White - 5".
 5. () Black-white - 4 3/4".
 6. () Yellow - 6".
 7. () Green - 5 3/4".
 8. () Black - 5 3/4".
- b. () Mount T2 and C50 10 mfd - 10 mfd 50WV electrolytic capacitor in position as shown, with the side of T2 which includes the red lead toward the middle of the chassis, the mounting strap of C50 toward the front. Pull the leads of T2 through the grommets. Secure at each foot with the following hardware, starting from the top of the chassis: 3/8" 8-32 screwhead, #8 shakeproof, T2, chassis, C50 strap, #8 shakeproof, 8-32 nut.
- c. () Connect the negative lead of C50 to the teardrop at the securing nut of SW5, meter switch, bracket. Cut off any excess lead and solder. Bend C50 into position as shown in Figure 8A.
- d. () Twist the red, blue and brown leads of T2 together two turns. Train the leads along the chassis between X9 and X10 and connect the leads as listed:
1. () Blue to pin 3 of X9.
 2. () Brown to pin 3 of X10.
 3. () Red to terminal 1 of X21.
- e. () Twist the green, yellow and black leads together two turns. Train the leads along the bend of the chassis and connect them as listed:
1. () Yellow to terminal 5 of X18.
 2. () Black to terminal 3 of X18.
 3. () Green to terminal 1 of X18.

- I. 4. n. () L14, 4.7 micro H choke (molded 1/4" x 1 1/4" body), 1/2" leads, between the tip terminal of J2 and terminal 1 of terminal strip X26. Solder all connections on J2 and X26.
5. () Mount and connect the driver transformer, T3, as shown in Figure 8A in the following steps:
- a. () Cut the leads to the indicated lengths, strip 5/16", and tin ends as listed:
1. () Red - 6 1/2".
 2. () Blue - 4 1/2".
 3. () Yellow - 5".
 4. () Green - 5".
 5. () Black - 7".
- b. () Mount T3 in position, red and blue leads toward front of chassis, and secure (starting at the foot near the chassis) with the following hardware at each foot, starting inside of the chassis: 1/4" 6-32 binding type screwhead, #6 shakeproof and #6 teardrop (only at the foot near the chassis lip), T3 foot, chassis, #6 shakeproof, 6-32 nut.
- c. () Connect and solder the T3 leads in the following steps:
1. () Black lead to terminal 4 of X20.
 2. () Blue to pin 6 of X8.
 3. () Red, trained directly to the chassis, toward the blue lead and along the chassis to terminal 1 of X19. Do not solder this terminal.
 4. () Twist the green and yellow leads together 2 1/2 turns.
 5. () Green to terminal 2 of X21.
 6. () Yellow to terminal 4 of X21. Do not solder this connection.

J. FINAL TANK, COUPLING CIRCUIT, HV CHOKE MOUNTING AND CONNECTIONS. Refer to Figures 8B and 8C.

1. () Make up C39A and C39B, 300 mmfd small silvered mica condensers (ruby) in the following steps:
- a. () Cut leads of C39B to 3/8" and 7/8".
 - b. () Cut leads of C39A to 3/8" and 1 3/8".
 - c. () Form hooks on the 3/8" leads, hook them together, crimp and solder, to connect C39A in series with C39B.
 - d. () Connect the 7/8" lead to the left (rear view) front stator, C8B, and the 1 3/8" lead to the rotor terminal at the rear of C8. Train the condensers into position, as shown in Figure 8B, and solder only the front connection.
2. () Mount the insulated teardrops in the hole just below the rear bandswitch wafer, SW3B (as viewed in Figure 8C), with the following sequence, starting from topside: 3/8" 6-32 screwhead, #6 shakeproof, #6 teardrop, 7/16" OD fiber shoulder washer (shoulder in the hole), chassis, shoulder washer (shoulder in the hole), #6 teardrop, #6 shakeproof, 6-32 nut. Orient the bottomside teardrop pointing toward the rear and the topside teardrop pointing toward the final octal socket, X5, while tightening the nut. Bend each teardrop away from the chassis 60°.
3. () Mount a #6 teardrop (pointing toward the middle of the chassis) on the extension of the rear mounting screw of C8 with a 6-32 nut. Do not secure tightly at this time.

- J. 4. () Cut a 6 1/2", #16 tinned copper lead and pass one end through the topside insulated teardrop, inserting it from the rear. Pass the lead on through the large 5/8" hole (in line with X5), through the hole near the phenolic on the pin 1 terminal of X5, to the hole near the phenolic on pin 6 of X5. Make a hook connection at pin 6. Pass the free end of the lead (at top-side) through the hole of the teardrop at the rear of C8 and up through the hole of the rotor terminal of C8. Cut off excess, train the lead to the middle of the hole near X5 and space it about 1/8" from the chassis on the topside to the C8 teardrop, solder the lead at the C8 teardrop loosening the nut to prevent heat loss if necessary. Tighten the nut securely and solder the rotor terminal of C8 and the insulated teardrop.
5. () Cut a 3 1/2" #16 tinned lead. Place one end of the lead through the hole in the chassis just below the right stator terminal of C8B (the front stator viewed from the rear). Connect the other end to the right stator terminal of C8B. Solder the connection and offset the lead slightly to clear the stator insulator. Bend the free end of the lead (on the bottom-side) away from SW3B to keep the area free for later coil connections.
6. () Mount and connect the high voltage choke, LP1, in the following steps:
- () Cut both leads to 11 1/2" length unless LP-1 is supplied with leads near these lengths. Strip 3/8" and tin the ends.
 - () Place LP1 in position, passing the leads through hole near the rear edge of the chassis. Secure at all but the inner rear foot with hardware in the following sequence starting from the top: 3/8" 8-32 round screwhead, #8 shakeproof, LP1 foot, chassis, #8 shakeproof, 8-32 nut.
 - () Train the LP leads along the harness to X24 and connect one lead to terminal 1 of X24 and the other lead to terminal 2 of X24. Solder both terminals.
7. () Install the mike and key jack shield, CH13, in the position shown in Figure 12. Secure with four #4 1/4" binding head sheet metal screws after the mike, key and HV choke leads have been trained in the slot and notch.
8. () Mount C9, the 360 mmfd variable condenser, in position as shown in Figure 12. Secure the condenser in place at each end with the following hardware sequence, starting from topside: 1/2" 6-32 round screwhead, #6 shakeproof, LP1 foot (only at rear), chassis, 5/16" aluminum spacer, C9 foot.
9. () Mount L11B, the 1" diameter, space wound coil in the following steps, noting the terminal and lead positions in Figure 8B before proceeding:
- () Connect and solder a 3 1/2", #16 tinned lead to the lower terminal.
 - () Train the lead downward about 30° at the terminal. Make a bend downward another 60° at a distance of 1 1/2" from the terminal.
 - () Move the coil into position, pass the bent lead through the middle of the large hole near the left front corner of C8A (viewed from the rear) and secure each of the coil lugs at the bottomside of the chassis with a #6 shakeproof and a 6-32 nut. The #16 lead will be connected later.
10. () Mount the final shield, CH5, in the following steps, referring to Figure 11 for orientation:
- () Attach a 1/2" x 7/8" aluminum L bracket, B12, to the rear of CH5 at the hole near the middle of the shield. Orient the bend of the bracket upward and secure it with the following sequence of

- I. 1. f. () Train the white and black-white leads along the chassis to X20 and connect them as listed:
1. () White to the teardrop on the rear foot of X20.
 2. () Black-white to terminal 3 of X20.
2. () Make the speech amplifier connections as listed. Solder only as directed unless it is desired to solder connections with a minimum of solder, keeping terminal holes open.
- a. () R22, 4700 ohm, 1/2 watt resistor, 1/2" leads, between pin 8 and the ground ear near pin 6 of X7. Mount under the shielded lead.
 - b. () R18, 4700 ohm, 1/2 watt resistor, 1/2" leads, between pin 3 and the ground ear near pin 1 of X7.
 - c. () C56, 500 mmfd small mica condenser (tan or red), 1" leads, between pins 6 and 9 of X7. Place C56 under the shielded lead.
 - d. () C54, .005 mfd disc ceramic condenser, 1/2" leads, between pin 3 and the ground ear near pin 6 of X7.
 - e. () C53, 200 mmfd small mica condenser (tan), 5/8" leads, between the outer terminals of the audio control, R21.
 - f. () The front positive lead of C50, 1 1/2" length covered with 1 1/4" of .051" ID varnished tubing (if not insulated) to pin 8 of X7.
 - g. () The rear positive lead of C50, a 2" length, covered with 1 1/2" of varnished tubing (if not insulated) to pin 3 of X7. Pass the lead between the center post and pin 1 of X7.
 - h. () C52, 500 mfd small mica condenser (tan or red), 1" leads, between the most clockwise (viewed from the rear) terminal of R21 and pin 1 of X7. Solder both outer terminals of R21.
 - i. () R19, 470,000 ohm 1/2 watt resistor, 3/4" leads, between terminal 2 of X19 and pin 1 of X7.
 - j. () Solder all pin, center shield, and ground connections on X7 with the exception of pin 6.
3. () Make the decoupling component and driver amplifier connections as listed:
- a. () C51, 0.1 mfd tubular paper condenser, 1" lead at the band end, and 3/4" at the "hot" end. Connect the "hot" end to terminal 2 of X19 and the band end to the ground ear near pin 8 of X8.
 - b. () R20, 220,000 ohm, 1/2 watt resistor, 3/4" leads, between terminals 1 and 2 of X19.
 - c. () R24, 47,000 ohm, 1/2 watt resistor, 1/2" leads, between terminals 1 and 3 of X19.
 - d. () C73, .005 mfd disc ceramic condenser, 1/2" leads, between terminal 5 of X19 and the teardrop at the front foot of X19.
 - e. () C55, 0.1 mfd tubular paper condenser, 1 1/4" leads, between terminal 3 of X19 and the teardrop at the rear foot of X20. Connect the band end to the teardrop.
 - f. () R28, 820 ohm 1/2 watt resistor, 1/2" leads, between pin 3 of X8 and the ground ear near pin 1 of X8.
 - g. () C70, .005 mfd disc ceramic condenser, 1/2" leads, between pin 9 and the ground ear near pin 8 of X8.
 - h. () R27, 150,000 ohm, 1/2 watt resistor, 3/4" leads, between pin 2 of X8 and terminal 3 of X20.
 - i. () Mount C59, dual 15 mfd 150 volt electrolytic condenser, with mounting strap provided, in the hole on the side edge of the chassis above X10 with the strap toward the top of the chassis. Use the following sequence, a 1/4" 6-32 binding head, chassis, capacitor mounting strap, #6 shakeproof, #6-32 hex nut. The blue and black leads toward the front edge of chassis.
 - j. () Cut both the black and green leads of C59 to 3" length. Strip and tin 5/16" on ends. Connect both leads, but do not solder, to pin 2 of X10.

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- k. () Route the blue lead along the chassis over to terminal strip X20, connect but do not solder to terminal 4.
- l. () Route the red lead to pin 3 of X8, connect but do not solder.
- m. () R23, 470,000 ohm, 1/2 watt resistor, 5/8" leads, between pin 6 of X7 and terminal 3 of X19.
- n. () C57, .02 mfd, 400 volt, paper tubular condenser, 3/4" leads, between pin 6 of X7 and pin 7 of X8.
- o. () Yellow lead, 1" length, between pins 2 and 7 of X8.
- p. () Black lead, 1 1/8" length, between pins 3 and 8 of X8.
- q. () Blue lead, 1 1/4" length, between pins 1 and 6 of X8.
- r. () Solder pin 6 of X7, all unsoldered leads with the exception of terminal 1 on each of X19 and X20, terminal 4 of X20, and all pins and center shields, with the exception on pin 6 of X8. Solder teardrops at rear of X20 and at the front of X19. Solder ground ears of X8.

4. () Make the modulator and clamper tube connections as listed:

- a. () C71, 0.1 mfd, paper tubular condenser, 1 1/4" leads between pins 1 and 6 of X10. Connect the band end to pin 1.
- b. () Cut a 3" length of black plastic covered wire, strip 5/16" on each end. Connect between pin 8 of X9 and terminal 1 of X20.
- c. () SH5, .51 ohm 1/2 watt resistor, 3/4" leads, between terminal 1 of X20 and ground lug near pin 3 of X8. Solder at both X8 and X20.
- d. () R30, 100 ohm, 1/2 watt resistor, 5/8" leads, between pins 4 and 6 of X9.
- e. () R31, 100 ohm, 1/2 watt resistor, 5/8" leads, between pins 4 and 6 of X10.
- f. () C60, .005 mfd, 400 or 600 volt paper tubular condenser, 3/4" leads between terminals 2 and 4 of X21.
- g. () R32, 100 ohm, 1/2 watt resistor, 3/4" leads, between pin 5 of X9 and terminal 2 of X21.
- h. () R33, 100 ohm, 1/2 watt resistor, 5/8" leads, between pin 5 of X10 and terminal 4 of X21.
- i. () Solder all unsoldered pins and teardrops on X9 and X10.
- j. () C85, .005 mfd disc ceramic condenser, 1/2" leads, between pin 6 and the center shield post of X6.
- k. () Make up and connect R38, three paralleled 33,000 ohm, 1 watt resistors, in the following steps:
 - 1. () Cut the leads of two of the resistors, R38A and R38B to 1/2" length.
 - 2. () Lay R38A against R38C (the resistor with the uncut leads). Hook and crimp the leads of R38A over the leads of R38C near the resistor end.
 - 3. () Lay R38B between R38A and R38C. Hook and crimp the leads of R38B over the leads of R38C as in (2) and solder the hooked connections at each end of R38C.
 - 4. () Cut the R38C leads to 1" lengths and connect R38 between pin 6 of X6 and terminal 5 of X21.
 - 5. () Solder terminals 1 and 5 of X21 and all unsoldered pin, center shield, and ground connections of X6.
- l. () Connect C69, .02 mfd 1600 volt tubular condenser, 1" leads. Orient C69 as shown in Figure 8A and connect it between terminals 1 and 5 of terminal strip X18. Solder all unsoldered terminals and leads on X18.
- m. () C72, .005 mfd ceramic disc condenser, 3/8" leads, between the two terminals of the keying jack, J2.

- J. 10.
- a. hardware, starting from the front: 1/4" 6-32 binding type screw-head, CH5, 1/2" bracket foot, #6 shakeproof, 6-32 nut.
 - b. (✓) Attach three 6-32 spade lugs to the bottom of CH5 with the following hardware sequence starting from the front: 1/4" 6-32 binding type screw head, CH5, spade lug, #6 shakeproof, 6-32 nut.
 - c. (✓) Place a large fiber shoulder washer over the threaded bushing of C8 (shoulder away from C8). Place CH5 into position in front of the shoulder washer. Adjust the spade lugs until they drop into the chassis holes and secure each with a #6 shakeproof and a 6-32 nut at the bottomside of the chassis. Place the teardrop attached to the disc ceramic condenser, C36, between the shakeproof and nut on the spade lug near SW3A.
11. () Make #16 tinned wire tap connections to L11A, the main final inductor by cutting the leads to the indicated lengths, forming a 1/16" ID open hook on one end of each lead, hooking the lead over the indicated offset between winding sections on L11A and soldering the hook in place quickly with a clean hot iron. Make connections as listed, training the tap leads directly away from the coil:
- a. (✓) 5" to the middle of the offset between the five turn and three turn sections.
 - b. (✓) 4 1/4" to the middle of the offset between the three turn and two turn sections.
 - c. (✓) 3 3/4" to the middle of the offset between the inner two turn section and the single turn section.
 - d. (✓) 3 3/4" to the middle of the offset between the single turn section and the outer two turn section.
12. () Mount the main final coil in position as shown in Figure 8B. Pass the four tap leads through the rear four 7/16" holes and secure the front of the polystyrene support bar with the following sequence: 3/8" 6-32 round screwhead, poly support bar, bracket, B12, #6 shakeproof, 6-32 nut. Secure the rear of L11A to the rear support stud, D35 with a #6 shakeproof and a 6-32 nut.
13. () Make the following L11A connections:
- a. (✓) Make a slow bend (3/16" radius) on the rear lead (extension of winding) and bring the lead directly to the rear right (viewed from rear) stator terminal on C8A. Cut off any excess lead beyond that needed to make a connection, and connect the lead to the terminal.
 - b. (✓) Offset the front lead (extension of the winding) 1/8" away from the coil at a distance of 1/4" from the poly support bar. Bring the bend to the top terminal of the 160 meter auxiliary coil L11B, cut off any excess beyond that needed to make a connection, and connect the lead to the top L11B terminal. Solder.
 - c. () Bend and train the front tap lead (between the 3 and 5 turn sections) 1/8" from the bottom chassis surface under SW3 to clip 12 of SW3B. Bend the end of the lead into clip 12 and solder it in place. Do not attempt to hook the lead in the terminal in this and following steps.
 - d. (✓) Bend and train the second tap lead from the front to clip 1 of SW3B in the same manner and solder the lead in the clip 1 terminal. Trim any excess.
 - e. () Bend the second tap lead from the rear to clip 2 of SW3B. Solder the lead in clip 2 and trim any excess.

J. 13.

- f. () Bend the rear tap lead to the rear terminal of clip 3 of SW3B. Solder the lead in clip 3 and trim any excess.
- g. () Make the following jumper connections at SW3B, making right angle bends on the jumper near each clip terminal so that the jumper end can be engaged into the clip terminal easily:
 - 1. () 1 3/4" #16 jumper between 5 and 3. Locate the jumper on the ceramic, engaging the clip terminal from the rear. Solder at both clips.
 - 2. () 1 3/4" #16 jumper between clip 11 (at the rear of the wafer) and clip 9 (at the front of the wafer). Locate the jumper at the front of the wafer. Solder only clip 9.
- h. () Cut a 7 1/4" #16 lead, form a hook on one end. Crimp and solder a hook connection on the front lead of L11A (connected to the top terminal of L11B) 1/4" from the poly support bar holding the 7 1/4" lead upward. Bend and train directly over the poly support bar to 1/4" on the opposite side of the bar. Then bend the lead and train it into the remaining 7/16" diameter hole on the chassis. On the bottomside, bend the free end of the lead to run 1/8" from the chassis directly toward clip 11 of SW3B. When the lead is in line with the terminal, make a right angle bend toward the clip terminal, form a right angle hook at the terminal and engage the hook into the terminal with the jumper which has already been engaged and solder the terminal.

14. () Complete the connection to SW3B as follows:

- a. () Bend the lead from the C8B stator directly to clip 4. Engage it in the terminal and solder.
- b. () Check all leads to SW3B for at least 1/8" clearance to switch terminals and for centering in the chassis holes.
- c. () Make up and connect C38 in the following steps:
 - 1. () Cut the leads of the two 150 mmf, small silvered mica condensers (ruby), C38A and C38B, to 1/4" and 1/2" lengths. Hook the 1/4" leads together, crimp, and solder them. Connect and solder the free lead of C38B to the insulated teardrop below SW3B. Connect and solder the free end of C38A to clip 6 of SW3B.

15. () Mount SW6 and make the coupling circuit connections as follows:

- a. () Mount the long shafted single wafer ceramic wafer switch, SW6, with the bracket, B1, and hardware in the following sequence:
 - 1. () 3/8" shakeproof over the threaded switch bushing against the shoulder.
 - 2. () 1 5/8" long, 5/8" wide L bracket, foot toward the wafer, over the bushing.
 - 3. () 3/8" -32 nut over shaft - do not start on the bushing at this time.
 - 4. () A 3/8" threaded panel bushing over the shaft with the hex end toward the switch wafer.
 - 5. () Another 3/8" shakeproof over the shaft.
 - 6. () Insert the shaft through the front chassis hole (refer to Figure 12).
 - 7. () Move the switch and put the switch bracket in place over the middle mounting hole of the Final Condenser C8. Secure the bracket to the middle mounting tap of C8 in the following sequence: 3/8" 6-32 round screwhead, #6 shakeproof, bracket foot, chassis, fiber washer, condenser

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- a. 7. mounting foot (center post).
 8. (✓) Push the threaded bushing into the front chassis hole and secure it with a 3/8"-32 nut. Hold the switch in place while tightening the nut.
 9. (✓) Place the switch, SW6, in position as shown in Figure 5D and secure it tightly to the bracket.
 - b. (✓) Connect the #16 lead coming from L11B near SW6 to terminal 12 of SW6, keeping the lead against terminal 11 of SW6.
 - c. (✓) Solder a 2 5/8" #16 lead to the center terminal of the 83-1R jack, J3. Bring the other end of the lead to clip 11 of SW6, make a bend on the lead to connect it to clip terminal 11 of SW6 and at the same time forming a loop around the lead connected to clip 12. Solder clip terminals 11 and 12 and the loop connection at 11.
 - d. (✓) Cut a 1 1/4" #16 jumper. Solder one end to the rotor terminal of C9 and hook and solder the other end to the teardrop just behind C9 of J3.
 - e. (✓) Cut a 5/8" #16 jumper and connect the left (viewed from the rear bottom-side) stator terminal of C9 to the J3 output lead. Simply form a jumper hook on the lead near the C9 stator and hook the free end of the jumper to the C9 stator terminal. Solder the connections.
16. (✓) Make up the 6" output RG59U coaxial lead, W14, as follows:
- a. (✓) Strip the vinyl jacket and the shield off 5/8" of each end by pressing a sharp knife blade around the coax several times and pulling off the jacket and shield. Take care not to cut too deeply - thus ruining the polyethylene insulation.
 - b. (✓) Strip only the vinyl off a 3/8" band starting 2 3/4" from one end and another 3/8" band starting 1 5/8" from the other end.
 - c. (✓) Strip 3/8" of the polyethylene from each end of the RG59U exposing the inner conductor.
 - d. (✓) Loop 1 1/4" leads (stripped black) around the W14 shield at the stripped bands and solder them in place quickly.
 - e. (✓) Place W14 into position behind SW3B and SW6 with the 2 3/4" end toward clip 10 of SW3B. Connect the braid leads to the teardrops on the chassis, pulling W14 as near the chassis as possible. Solder both teardrops.
 - f. (✓) Connect and solder the inner conductor of W14 near SW3B to both terminals of clip 10, bending the terminals together to facilitate connections.
 - g. (✓) Connect the inner conductor of the other end of W14 to the lead between SW6 and J3 just in front of the C9 stator terminal. Loop the inner conductor around the #16 lead and solder the connection.
17. (✓) Connect the fixed coupling capacitors to SW6 in the following steps:
- a. (✓) Cut one lead of each of C40A and C40B, 300 mmfd small mica condensers (tan or red), to 1/4" length and the other lead to 5/8" length. Connect the 1/4" lead ends together by hooking, crimping, and soldering them. Connect the series assembly between the teardrop nearer the chassis on J3 and clip 6 of SW6.
 - b. (✓) Cut and connect C41A and C41B, 500 mmfd small mica condensers (tan) in the same manner of step (a) and connect the C41 series assembly between the teardrop nearer the chassis on J3 and clip 5 of SW6.
 - c. (✓) Cut the leads of C42, 300 mmfd small mica condenser (tan or red) to 1 1/8" length and connect it between the teardrop nearer the

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chassis J3 and clip 4 of SW6.

- d. () Cut all leads on C43, C44 and C45, each 300 mmfd small mica condensers (tan) to 1" length. Connect one end of each condenser to the teardrop away from the chassis on J3. Connect the free lead of C43 to clip 3, the free lead of C44 to clip 2 and the free lead of C45 to clip 1 of SW6.
- e. () Solder all unsoldered clips of SW6 and the two teardrops at J3.

18. () Complete the final stage connections. The following connections on X5 affect the stability of the transmitter somewhat. Follow instruction carefully.

- a. () Bend the #10 teardrop, near X5, away from the chassis. Pass one end of the 2 5/8" #16 tinned lead through the upper hole on the pin 1 terminal of X5, inserting the lead at the inside of the terminal. Move the lead to the #10 teardrop hole passing it through the hole from the X5 side of the teardrop until 3/16" extends beyond the teardrop. Bend the 9/16" extension 180° back over the teardrop end so that the lead is doubled to terminal 1. Pass the free end of the lead through the hole near the chassis on pin terminal 4. Cut any excess lead 1/8" beyond the terminal when the lead is pulled and the #10 teardrop is bent in line with its mounting screw and the pin 1 terminal. Solder the teardrop and pin 1 terminal so that the doubled part of the lead is well sweated together and both of the #16 leads at pin 1 are soldered to the terminal.
- b. () Push a 1 1/8" #16 tinned lead through the hole near the phenolic on pin terminal 7 of X5 from the outside of the socket, on through the hole near the phenolic on pin terminal 8. Solder at both pins. Connect the free end to the grounded terminal on the near-by 2 terminal strip, X30, and solder the terminal.
- c. () Make the following connections to X5:
 - 1. () C49, .005 mfd disc ceramic condenser, 1/2" leads between pin 2 (hole near the phenolic) and the teardrop at the rear of X5.
 - 2. () A 1 1/4" blue jumper between the terminal near the chassis on R15 and pin 3.
 - 3. () Connect the brown harness lead, 9A, at the rear of X5 to the terminal near the chassis on R15.
 - 4. () C47, .002 mfd 1500 volt disc ceramic condenser, 3/8" leads between pins 3 and 4. Use the hole near the phenolic on pin 4 and the hole away from the phenolic on pin 3.
 - 5. () L8, the six turn 56 ohm parasitic suppressor, 3/8" leads (from the end of the winding) between pin 5 (hole near the phenolic) and the insulated terminal of X30. Orient L8 to the right of X5 and X30, viewed from front of chassis.
 - 6. () Solder all terminals of X5, the teardrop at the rear of X5 and both terminals of R15.
- d. () Complete the following final grid circuit connections. Refer to Figure 9A.
 - 1. () R37, 27,000 ohm 1/2 watt resistor, 1/2" leads, between terminals 2 and 3 of X17.
 - 2. () SH3, 20 ohm, large 1/2 watt resistor, 7/8" leads, between terminal 3 and the teardrop at the X17 mounting foot near X5.
 - 3. () L7, 4 pi RF choke, 1" leads (from the body) between terminal 2 on X17 and the insulated terminal of X30.

- J. 18. d. 4. (✓) C32, 50 mmfd small mica condenser (tan), 3/8" and 1/2" leads. Orient C32 edgewise against the final shield mounting lug nut, along the side of the lug extension toward the middle of the chassis, as shown in Figure 9A. Connect the 1/2" lead to the insulated terminal on X30 and the 3/8" lead to the hot lead of L6B about 1/4" below the lower support terminal (viewed from the bottomside).
5. (✓) Solder all connections of C32, X30, and terminals 2 and 3 and the ground teardrop of X17.
- e. (✓) Complete the topside final connections as follows:
1. (✓) C37, .002 mfd large square 1500 volt mica condenser, 1 1/4" leads, between the C8A stator and the top cotter pin terminal of the 3 pi RF choke, L10. Make the connection to the stator by looping the end around the #16 lead to L11A just above the stator terminal.
 2. (✓) C47, .002 mfd 1500 volt disc ceramic condenser, 1/2" leads between the lower terminal of L10 and the grounded terminal of X31. Orient C47 in front of X31.
 3. (✓) C48, .002 mfd 1500 volt disc ceramic condenser, 1/2" leads between the two terminals of X31. Orient C48 at the rear of X31.
 4. (✓) L13, 4.7 micro H choke (molded body), 1/2" leads between the lower terminal of L10 and the insulated terminal of X31.
 5. (✓) L9, the 9 turn 300 ohm parasitic suppressor, 1" leads between L10 top terminal and the 6146 tube cap, J6. Hook and solder one end to the tube cap terminal.
 6. (✓) Solder all connections made in the previous steps of part e, and stator connection on C8A.

K. POWER TRANSFORMER MOUNTING AND CONNECTION. Refer to Figure 11 for location and Figure 1 for terminal identification.

1. () Cut, strip 3/8" and tin the leads of the power transformer T1 to the following lengths if T1 is not supplied with these lengths:

a. () black - 2 1/2"	h. () red - 3"
b. () black - 2 3/4"	i. () red - 2 1/2"
c. () green - 3"	j. () blue - 5 1/4"
d. () green - 3 1/4"	k. () blue - 6 1/4"
e. () yellow (grouped with green and black) - 7"	l. () brown - 15"
f. () red-yellow - 2"	m. () brown - 15"
g. () yellow - 3 1/2"	
2. () Put the transformer in position on the chassis pushing the black, yellow (single lead) and green lead through the rear hole provided and the remaining leads through the front hole.
3. () Secure T1 at each foot with the following hardware sequence, starting from the top of the chassis: 3/8" 8-32 round screwhead, #8 shakeproof, T1 foot, chassis, #8 shakeproof, 8-32 nut.
4. () Connect the transformer lead as follows:
 - a. () Black (shorter) to terminal 4 of X23. Solder.
 - b. () Black to terminal 3 of X23.
 - c. () Green (longer) to one teardrop at front of X23.
 - d. () Green to terminal 6 of X17.

- K. 4.
- e. () Rear yellow - along harness to the front of X23, then to pin 8 of X11. Solder
 - f. () Front yellow - along harness to pin 2 of X11. Solder.
 - g. () Red-yellow to the open teardrop at the front of X23. Solder both teardrops at X23.
 - h. () Red (shorter) to pin 6 of X11. Solder.
 - i. () Red to pin 4 of X11. Solder
 - j. () Blue (longer) along chassis bend to pin 5 of X12.
 - k. () Blue along chassis bend to pin 3 of X12. Solder all unsoldered terminals and grounds at X12.
 - l. () Train both the brown leads along the side of the chassis toward the front and route up through the ventilating hole ($3/8$ " diameter) between X12 and the square cutout for SW4. These two leads will be connected to the keyer plate later on in the instructions.
 - m. () Train the leads along the chassis bend or along the harness neatly. For greater neatness, the T1 and LP1 leads may be taped or tied to the harness in one or two places.

L. AUXILIARY POWER SOCKET AND LINE FILTER ASSEMBLY AND WIRING. Refer to Figures 1A & 9A.

- 1. () Prepare and mount X13A in the following steps.
 - a. () Cut off all of the pin terminals of the 9 pin octal style socket just below the upper hole (socket viewed from the bottom).
 - b. () Cut eight $15/16$ " pieces of #16 tinned wire. Form a $1/8$ " long hook on the end of each.
 - c. () Hook, crimp and solder the short pieces of wire to the pins, except pin 9, extending the straight ends directly away from the terminals.
 - d. () Form a $1/8$ " hook on a 2" #16 tinned lead. Hook, crimp and solder the lead to pin 9 of X13A with the lead extending directly away from the terminal.
 - e. () Mount X13A and the shield, X13C, (refer to Figure 1), passing the X13A leads through the shield holes which cause the least bending of the leads as X13C is brought into position. Secure X13A and X13C at each lip with the following sequence, starting from the outside: $3/8$ " 6-32 round screwhead, #6 shakeproof, X13A lip, chassis, X13C lip, #6 shakeproof, two #6 teardrops (one pointed toward the lip of the chassis and the other pointed away from the lip of the chassis), 6-32 nut. Bend the teardrops away from the X13C lips. NOTE: Pins 1 and 9 to be toward chassis lip.
 - f. () Bend the long lead (from pin 9 of X13A) to the teardrop pointing toward the chassis lip on the screw toward the middle of the chassis. Train against X13C. Connect and solder the lead.
 - g. () Cut and push $7/16$ " lengths of the .051 ID varnished tubing over the remaining 8 leads from X13A, insulating them from X13C.
- 2. () Connect the by pass condensers to the auxiliary socket and line filter in the following order, making the connections to the X13 extensions by looping the condenser leads around the extensions near the varnished tubing and soldering lightly to hold the leads in position. Maintain $1/16$ " of clearance between the condenser bodies and the X13C shield.
 - a. () C83, .002 mfd 1500 volt disc ceramic, $11/16$ " leads, oriented between X13C and the chassis, between the pin 5 extension of X13A and the teardrop pointing toward the chassis on the X13 mounting screw near X24.

L. 2.

- b. (✓) C79, .005 mfd 600 volt disc ceramic, 11/16" leads, between pin 4 and the teardrop used in a. Solder both leads at the teardrop.
- c. (✓) C66, .002 mfd 1500 volt disc ceramic, 11/16" leads, between the teardrop on X13, near X24, pointing toward the chassis lip, and pin 3 of X13, orienting along the side of X13C.
- d. () C68, .002 mfd 1500 volt disc ceramic, 11/16" leads, between the teardrop used in c and pin 2 of X13.
- e. (✓) C67, .002 mfd 1500 volt disc ceramic, 3/4" and 7/8" leads, between the teardrop used in c and pin 1 of X13. Connect the 7/8" lead to the teardrop and solder the teardrop before completing the training of C67 against the shield side and connecting the 3/4" lead.
- f. (✓) C84, .002 mfd 1500 volt disc ceramic, 11/16" leads, between the unused teardrop on the X13 securing screw toward the middle of the chassis and pin 6 of X13. Train C84 along the side of X13C.
- g. (✓) C75, .005 mfd 600 volt disc ceramic, 5/8" leads, between the teardrop used in part f and pin 7 of X13.
- h. (✓) C74, .005 mfd 600 volt disc ceramic, 5/8" leads, between the teardrop used in part f and pin 8 of X13. Solder the teardrop.
- i. (✓) Train all condensers installed in above steps so that they are slightly clear of the X13C shield and each other.
- j. (✓) Connect C61A, C62A, C63A, C61B, C62B, and C63B, each a .005 mfd disc ceramic condenser, between the terminal strips, X28 and X29 and the chassis teardrops. Refer to Figure 1A for terminal strip location and numbering and to Figure 9A for component positioning. Cut the leads of each condenser to the indicated length. Locate all condensers so that the effective lead lengths after connection are short, 1/8" to 1/4" leads should be possible in most cases. Bend the teardrops near J5 and on X29 outward approximately 60°. Make the following connections:
 - 1. () C62B, 1/2" leads, between the terminal on J5 and near teardrop away from the chassis lip. Locate C62B toward the top bend of the chassis. Solder the teardrop.
 - 2. () C63A, 1/2" leads, between the terminal on J5 and the near teardrop toward the chassis lip.
 - 3. (✓) C61B, 1/2" leads, between terminal 5 of X28 and the teardrop used in 2. Solder the teardrop.
 - 4. (✓) C62A, 1/2" leads, between the teardrop at the foot of X29, near terminal 1, and terminal 1 of X29.
 - 5. (✓) C63B, 5/8" leads, between terminal 3 of X29 and the teardrop at the foot of X29 near terminal 1.
 - 6. (✓) C61A, 1/2" leads, between terminal 5 of X29 and the teardrop near terminal 3. Solder the teardrop.
- k. (✓) Cut two 1" pieces of #20 tinned wire (stripped black). Connect the terminal away from the chassis lip on J5 to terminal 1 of X28 and connect the other terminal of J5 to terminal 3 of X28. Solder the terminal away from the chassis lip on J5.

3. (✓) Connect and solder L17, L18, L19, L20, L21 and L22, 4.7 micro H.V.H.F. chokes (molded bodies) between X13 and the nearby terminal strips as follows:

- a. (✓) L20, 5/8" leads between pin 5 of X13 and terminal 1 of X17. Orient the X13 end of L20 away from the middle of the shield toward the chassis surface, making a loop connection to the pin 5 extension in such a way that maximum clearance is provided to the other terminal extensions.

- L. 3.
- b. (✓) L21, 3/4" leads between pin 6 of X13 and terminal 4 of X17, placing L21 over L20 and connecting L21 at pin 6 to allow maximum clearance to pin 4.
 - c. (✓) L22, 5/8" leads, between pin 4 of X13 and terminal 1 of X25. Orient L22 on the lower side on pin 4 (chassis viewed from the bottom).
 - d. (✓) L17, 5/8" and 3/8" leads, between pin 3 of X13 and terminal 2 of X25. Connect the 3/8" end to pin 3.
 - e. (✓) L19, 5/8" and 3/8" leads, between pin 2 of X13 and terminal 3 of X25. Connect the 3/8" end to pin 2.
 - f. (✓) L18, 5/8" leads, between pin 1 of X13 and terminal 3 of X24.
4. (✓) Make up and connect the 19 turn, #18 formex covered coils L23, L24, L25A, L25B, L26A, L26B, L27A and L27B.
- a. (✓) Make up thirteen of the 19 turn coils in the following steps:
 - 1. () Cut thirteen 28 1/2" lengths of wire.
 - 2. () Strip 5/8" of formex off the end of each wire and tin.
 - 3. (✓) Drill a 1/8" diameter hole 1 1/4" from the end of the 3/8" wood doweling provided.
 - 4. (✓) Wind the coils on the 3/8" round wood doweling with the following operations: Hook one end of the length of wire to a nail on a wall or post or clamp it in a vise. Bend a right angle on the other end 1" from the end placing the bent end through the hole in the doweling, and rotating the doweling to close wind the wire on the doweling. Straighten the hooked or clamped end of the wire, after the hooked end is reached, and make a right angle bend outward, 1" from the end to form a connecting lead on that end of the coil. Remove the other end from the doweling hole, shape the turn and bend the 1" end outward.
 - 5. (✓) Set aside five of the coils for later connection on the topside of the chassis.
 - b. () Connect the eight coils in the line filter assembly, referring to Figure 9A for coil location, and spreading the coils slightly:
 - 1. () L26B between terminal 1 of X28 and terminal 1 of X29. Solder only at X28.
 - 2. (✓) L27A between terminal 3 of X28 and terminal 3 of X29. Solder only at X28.
 - 3. (✓) L25B between terminal 5 of X28 and terminal 5 of X29. Do not solder either end.
 - 4. (✓) L26A between terminal 1 of X29 and terminal 1 of X23. Solder both terminals.
 - 5. () L27B between terminal 3 of X29 and terminal 3 of X23. Solder both terminals.
 - 6. (✓) L25A between terminal 5 of X29 and terminal 5 of X23. Solder both terminals.
 - 7. (✓) L24 between terminal 6 of X17 and pin 7 of X13. Solder at both ends.
 - 8. (✓) L23 between terminal 5 of X17 and pin 8 of X13. Solder at both ends.
 - c. (✓) Carefully check all coils and coil terminations to be certain that there is good clearance and that no possibility of shorts exists.

M. HV BLEEDER, LV CHOKE AND HV FILTER CONDENSER MOUNTING AND WIRING.

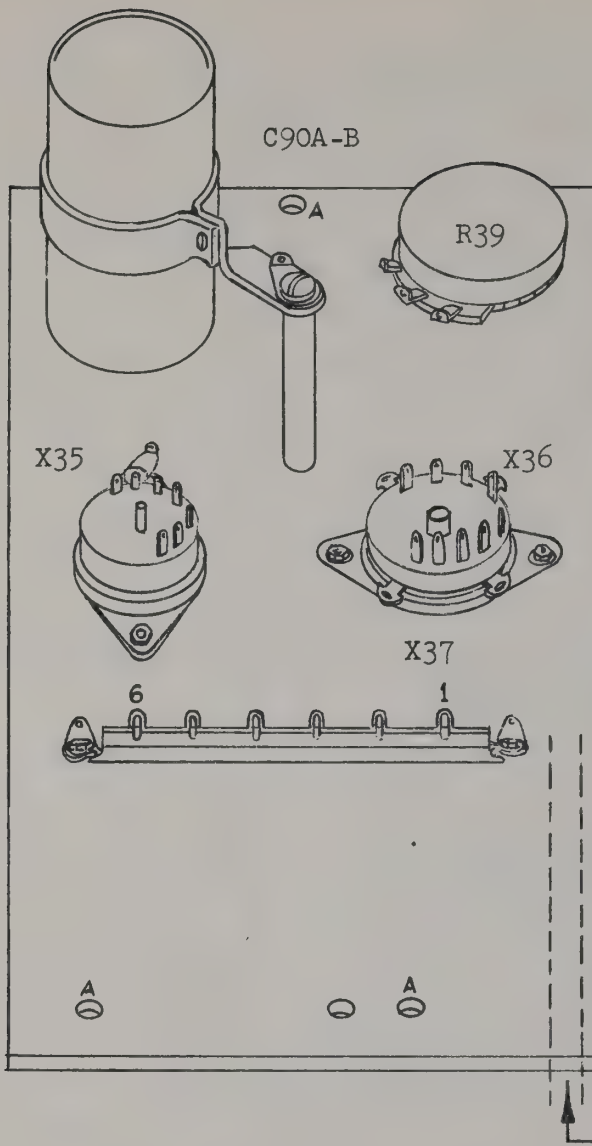
1. () Mount and connect R35, the 20,000 ohm, 50 watt power resistor as follows:
 - a. () Mount one of the end supporting brackets (may be with the miscellaneous hardware if not attached to the resistor) in the side of the chassis near the drive control R13. Point the V end toward the rear and secure lightly with the following sequence, starting from the outside: 1/4" 6-32 binding type screwhead, chassis, #6 shakeproof, #6 teardrop (pointed toward the chassis lip), bracket foot, 6-32 nut.
 - b. () Connect and solder a 1 7/8" #20 tinned (stripped black) lead to the teardrop, extending it directly away from the side of the chassis.
 - c. () Adjust the tap of R35 to the center of the resistor carefully, taking care to loosen the band screw sufficiently.
 - d. () Push R35 over the V end of the bracket mounted in b, orienting it in position as shown in Figure 12. Push the other mounting bracket into the rear end and secure it in position near X11 with the following sequence, starting from the outside: 1/4" 6-32 binding type screwhead, chassis, bracket foot, #6 shakeproof, #6 nut. R35 will be slanted along the side. Tighten both mounting screws.
 - e. () Connect the terminal of R35, near X11, to pin 1 of X11 using #20 tinned wire. Solder pin 1 only.
 - f. () Connect tinned lead, step b, above, to near end of R35. Solder.
 - g. () Connect free gray lead, 36A, to adjustable tap on R35. Solder.
2. () Mount LP2, the low voltage filter choke.
 - a. () Cut the choke leads to 5" length. Strip 3/8" and tin each lead.
 - b. () Mount LP2 on the chassis side with leads toward the chassis. The leads should be trained between X11 and the side of the chassis to X12. Use the following hardware sequence starting from the outside of chassis: 6-32 2 1/2" screwhead, #6 shakeproof, chassis, LP2 foot, 2 1/16" aluminum spacer, 6-32 nut.
 - c. () Connect one choke lead to pin 8 of X12. Solder.
 - d. () Connect the remaining choke lead to terminal 2 of X15. Solder terminal 1 and 2 of X15.
3. () Mount C77, the high voltage 10 mfd 700 volt working electrolytic condenser at the front mounting stud of the Low Voltage Choke LP2. Secure the strap (near the + end) to the screw extension at the front of LP2 with another #6 shakeproof and a 6-32 nut. Cut the negative lead to 1 3/8" and the positive lead to 2 3/4" length. Attach a #6 teardrop to the rear post of LP2 with another #6 shakeproof and a 6-32 nut. Connect and solder the negative lead to the teardrop. Move C77 into position along LP2 and temporarily solder the positive lead of C77 to terminal 2 of X15.
4. () Assemble and connect the line cord and plug in the following steps:
 - a. () Tie an overhand knot on one end of the line cord at a distance from the end so that 1 1/16" extends beyond the knot when it is tight.
 - b. () Part the conductors at the middle for a distance of 1".
 - c. () Strip and tin 3/8" at the end of each lead.
 - d. () Thread the untied end through the grommet near X25 from the inside of the chassis.
 - e. () Connect and solder one lead to the near terminal on J5, and the other lead to terminal 5 of X28.

- M. 4.
- f. () Readjust the knot, if necessary, to remove any slack on the leads or to prevent any strain on the connections, keeping the lead as short as possible.
 - g. () Tie an overhand knot in the free end of the cord allowing 1 1/16" to extend beyond the knot. Part the leads to the knot.
 - h. () Strip and tin 1/2" of each lead.
 - i. () Lay the terminal clips of the fused line plug, J4 (parts will be found in an envelope) in one of the half shells to determine how to train the ends of the leads to the screws. Connect the leads to the screws, forming hooks over the screws before tightening in place. Lay the knot and terminal clips in position in the half shell, pushing the leads carefully in place on each side of the parting ridge. Place the bayonet clips in position and secure the other half shell in place with the screw and nut provided.
 - j. () Place the 5 ampere fuse and the 3 ampere Fusetron or Slo Blo in the plug.
5. () Install extension shafts and couplings:
- a. () A 3/8" panel bushing at the front chassis hole in line with C9. Attach with the following sequence, starting from the inside: Hex bushing shoulder, 3/8" shakeproof, chassis, 3/8" nut.
 - b. () D29, 7 1/4" to C9 with a rigid metal coupling and four 3/16" 8-32 setscrews.
 - c. () Secure a large fiber shoulder washer to the shaft bushing of C8 with a 3/8"-32 nut. Place the shoulder toward the final shield.
 - d. () D30, 6 7/16" to C8 with a rigid fiber coupling and four 1/8" 8-32 setscrews. Make certain the teardrop contacts the shaft at the back of the bracket bushing on D30 and the following shaft, D31.
 - e. () D31, 5 5/16" to C7 with a rigid metal coupling and 1/8" 8-32 setscrews.
 - f. () D33, flexible disc coupling to C1. Start all four 3/16" 8-32 setscrews. Turn the C1 shaft counter-clockwise and secure D33 in place (with 1/16" clearance between the D33 hub and the C1 bushing) so that the front setscrews on D33 are down and to the right (when viewed from the front, chassis right side up).

ML. KEYS CONTROL UNIT ASSEMBLY

1. () Using the diagram, Figure K, mount the following components making sure that the tube sockets and variable resistor are oriented as shown, and also mounted on the correct side of the keyer chassis plate, CH16.
- a. () Mount X35, the 7 pin miniature socket, with a #6 solder lug near pins 4 and 5 using two 1/4 x 4-40 screws, four #4 shakeproof washers and two 4-40 hex nuts (use shakeproof washers above and below the keyer chassis plate).
 - b. () Mount X36, the 9 pin miniature socket, using the same hardware, but no solder lug, since the socket is provided with four grounded solder lugs.
 - c. () Mount terminal strip X37, 6 terminal strip, as shown, with 1/4 x 6-32 screws, #6 shakeproof washers and 6-32 hex nuts with #6 solder lugs at both mounting feet.
 - d. () Mount R39, 100,000 ohm potentiometer, using the 3/8-32 hex nut and 3/8 shakeproof washer. Place the shakeproof washer between the shoulder of the control mounting bushing and the keyer plate, secure with the 3/8 -32 hex nut, orientating the terminals as shown in Figure K.

- M1. 1. e. () Using one of the 1/4 x 6-32 binding head screws, mount the 1 3/8" x 1/4" tapped aluminum post in the hole provided near the 9 pin socket, X36.
- f. () Grasp the mounting strap of C90A and B, dual 15 mf 150 V electrolytic condenser, firmly in a pair of long nose or duck bill pliers. Carefully twist the mounting strap until it is 90° to its original position in order to be able to mount the condenser vertically on the post just installed.
2. () Cut the green and red leads of C90 to 2" length. Strip 5/16" and tin the ends.
3. () Cut the black and blue leads to 3" length, strip 5/16" and tin the ends.
4. () Mount C90 as shown in Figure K with the black and blue leads near the plate and the red-green leads away from the plate. Use a 1/4 x 6-32 binding head screw, #6 shakeproof washer and #6 solder lug for mounting.
5. () The red and green leads may now be connected and soldered to the solder lug just installed in mounting the condenser.
6. () Connect the black and blue leads of C90 to terminal 3 of X37. Do not solder.
7. () Make the following ground connections, using a 3" length of stripped black wire:
- a. () Pins 4, 5 and center shield, to ground lug near pin 6 of X36, the 9 pin socket. Do not solder.
- b. () Pin 3 and center shield of X35, the 7 pin socket, to ground lug near pin 3. Solder all connections.
- c. () Left terminal of R39, the 100,000 ohm potentiometer and the ground lug near pin 1 of X36, the 9 pin socket. Solder.
8. () Cut a 2" length of green wire, strip both ends and connect between pin 4 of X35 and pin 9 of X36. Solder pin 4 of X35 only.
9. () Cut a 1" length of black wire, strip 1/4" on both ends, form into jumper between pins 2 and 7 of X35, the 7 pin socket. Do not solder.
10. () Cut a 1 1/2" length of black wire, strip 1/4" on both ends, connect between pin 7 of X35 and terminal 6 of X37. Solder at pins 2 and 7 of X35 only.
11. () Cut a 3 1/4" length of white wire. Strip 1/4" on both ends. Connect between terminal 3 of X37 and the right hand terminal of R39. Solder at R39 only.
12. () Cut both leads of R38, 22,000 ohm 1/2 watt resistor, to 1/2" length. Connect between pin 1 of X36 and ground lug near pin 3. Solder ground end only.
13. () Cut a 1 1/4" length of blue wire, strip 1/4" on both ends, form into jumper between pins 3 and 8 of X36 on the 9 pin socket. Solder at pin 3 only.
14. () Cut both leads of R40, 1 megohm 1/2 watt resistor, to 1/2" length. Connect between pin 2 of X36 and center contact of R39, 100,000 ohm potentiometer. Solder at both points.



3 holes marked "A" for mounting of 3 aluminum posts.

Figure K

15. () Cut both leads of R41, 18,000 ohm 1/2 watt resistor, to 1/2" length. Connect between terminal 3 of X37 and pin 8 of X36. Solder at pin 8 only.
16. () Cut both leads of R42, 100,000 ohm 1/2 watt resistor, to 1/2" length. Connect between terminal 3 of X37 and pin 7 of X36. Do not solder.
17. () Cut both leads of R43, 47,000 ohm 1/2 watt resistor, to 1/2" length. Connect between terminal 1 of X37 and pin 7 of X36. Do not solder.
18. () Cut both leads of C89, .047 mf 200 V capacitor to 1" length. Connect between terminal 1 of X37 and pin 4 of X36. Train body of capacitor against chassis and flush with outside edge. Solder at pins 4, 5, center shield and ground lug of X36 only.
19. () Cut both leads of R45, 100,000 ohm 1/2 watt resistor to 1/2" length. Connect between terminal 1 of X37 and terminal 2 of X37. Do not solder.
20. () Cut both leads of R44, 330,000 1/2 watt resistor to 1/2" length. Connect between terminal 2 of X37 and the ground lug on the mounting foot of X37. Solder at the ground lug only.

- M1. 21. (✓) Cut both leads of R54, a 6800 ohm 2 watt resistor to 1" length. Connect between terminals 3 and 6 of X37, keeping resistor body against keyer plate. Solder at terminal 6.
22. (✓) Cut both leads of R52 and R53, 4700 ohm 1/2 watt resistors to 1/2" length. Connect one from terminal 3 to terminal 5 of X37, the other from terminal 5 to ground lug near terminal 6 of X37. Solder at terminals 3 and ground lug near terminal 6.
23. (✓) Cut a 20 1/2" length of black plastic wire and connect and solder one end to terminal 5 of X37. Route against chassis and over to terminal 1 of X37. Bend at right angle to X37 away from X37 and X36. Lead ends should be stripped 5/16".
24. (✓) Cut a 8 1/2" length of green plastic covered wire, strip 5/16" on each end. Route this lead at the end of X37 below terminal 1 and near the chassis. Connect one end to pin 9 of X36 and solder.
25. (✓) Cut a 14" length of orange plastic covered wire, strip 5/16" on each end. Route same as green lead, connect to pin 1 of X36 and solder.
26. (✓) Cut a 11 1/4" length of yellow plastic covered wire, strip 5/16" on each end, route at end of X37, connect to terminal 1 of X37 and solder.
27. (✓) Cut a 8" length of gray plastic covered wire, strip 5/16" on each end, route as in previous leads, connect to pin 7 of X36 and solder.
28. (✓) Cut a 8 1/2" length of red plastic covered wire, strip 5/16" on each end, route this lead along the previous leads, connect to pin 6 of X36 and solder.
29. (✓) Cut a 12 1/4" length of white plastic covered wire, strip 5/16" on each end. Route along other leads. Connect to terminal 2 of X37 and solder.
30. (✓) Inspect entire unit for any unsoldered joints and solder at this time.
31. (✓) Train all leads from keyer together in a cable, and away from the chassis at a right angle to terminal strip X37. A few narrow pieces of tape may be placed around the wires near X37 and also at a point not over 3" from the chassis to hold the cable together.
32. (✓) This completes the assembly of the keyer.

M2. KEYER CONTROL UNIT MOUNTING.

- (✓) The keyer plate assembly will be mounted on top of the three 2 15/16" aluminum spacers previously installed and will be directly above the operate switch wafers and V3, the 6CL6 oscillator stage.
- (✓) Train all leads from the keyer assembly through the ventilating hole between SW4 and X12. It will be noticed that the brown leads from the transformer are already trained up toward the keyer in this same hole.
- (✓) Train the two transformer leads along the balance of the keyer leads and over to the 7 pin miniature socket X35. The leads may be laced or taped together for neatness.
- (✓) Connect and solder one of the brown leads to pin 5 of X35.

M2. 5. (✓) Connect and solder the other brown lead to pin 1 of X35.

6. () Carefully place the keyer chassis in place on the three aluminum posts provided, making sure there is no tendency to disturb the clips on switch SW4 A and B.

7. () After the keyer is in place, temporarily secure by placing 1/4 6-32 binding head screw and #6 shakeproof washer, finger tight, through the mounting holes provided and into the aluminum spacers.

8. (✓) Invert the transmitter carefully and prepare to route the leads and make the following connections. Train the green, red and gray leads over to X15 and the white, orange and black leads along the harness near the front edge of the chassis.

a. (✓) The orange lead along the front edge of the chassis over to terminal 8 of X34 and solder.

b. (✓) The white lead along front edge of chassis over to terminal 7 of X34 and solder.

c. (✓) Connect and solder the green lead to pin 7 of X12.

d. (✓) Connect and solder the red lead to terminal 2 of X15.

e. (✓) Connect and solder the gray lead to terminal 3 of X15.

f. (✓) Route the yellow lead over to the insulated terminal of X39 by following the main harness toward X4. Connect and solder to the insulated terminal of X39.

g. (✓) Route the black lead along harness near front of chassis over toward audio section. Route straight back near terminal strips X19 and X20. Connect and solder to terminal 4 of X20.

h. (✓) In order to improve the appearance of the wiring, use an occasional piece of narrow tape around the harness to hold the newly added leads in place. Ordinary plastic tape may be cut into narrow strips with a common house scissors in order to accomplish this.

N. VFO PRELIMINARY TESTS.

1. (✓) Temporarily place 1 1/8" knobs on SW5, SW4, SW2, SW3, R13 and C7 shafts. (Use 3/16" 8-32 setscrews).

2. () Temporarily connect the meter M1 to the black and red meter leads with 1 to 2 foot lead extensions. Connect the red lead to the + terminal of M1. Be careful with the meter while testing. Lay the meter in its box to keep it from being damaged during these tests.

3. (✓) Spread the tube clips of the miniature sockets with a heavy needle or a scribe to prevent bending or breaking tube pins and place tubes (only those listed) in the sockets as follows:

6AU6 in the front socket of the VFO.

6AX5 in the rear socket of the VFO.

6CL6's in the V12 position shown in Figure 11.

6CL6's in the V3 and V4 positions.

6146 in the V5 position. Place the plate cap on the 6146.

12AU7 in the V13 position.

6AL5 in the V14 position.

- N. 4. (✓) Make the following switch and condenser settings (viewed from the front of the chassis):
- | | |
|-------------------------|--|
| "VFO Tuning" | C1 - counter-clockwise |
| all trimmers in the VFO | - mid-position |
| "Operate SW" | SW4 - counter-clockwise |
| "Band SW" | SW3 - first step away from the counter-clockwise position. |
| "Meter SW" | SW5 - first step away from the counter-clockwise position. |
| "Xtal-VFO-SW" | SW2 - first step away from the clockwise position. |
| "Keyer Control" | R39 - counter-clockwise |
5. (✓) Make the #20 tinned wire jumper connections listed, and plug in the 9 prong octal style male plug, X13B, as outlined below:
- () 2 1/2" length between pins 3 and 5.
 - () 2 3/4" length between pins 2 and 6.
 - () 2 1/4" length between pins 7 and 8.
 - () Solder the ends of the pins with a hot iron and trim any excess beyond the solder connection.
 - () Push the cover shell on the back of the receptacle.
 - () Plug X13B into X13A.
6. (✓) Plug J4 into a 115 volt AC outlet.
7. (✓) Turn SW4, the operate switch, one step clockwise and observe the filaments of the tubes. All should light.
8. (✓) Note the meter reading. It should be between 24 ma and 32 ma on 40 ma scale. This may be lower on the 15 and 20 meter bands.
9. (✓) Short circuit the close wound coil on L1 with a screwdriver. A marked rise in meter current should be noted if the VFO is operating. If this rise is not noticed, check leads and terminals for clearance and the circuits for correctness.
10. (X) Listen for the VFO signal on a receiver. It should be found within 100 kc of 1725 kc or 300 kc of 3960 kc. When C1 is turned clockwise, the signal should be found within 100 kc of 1980 kc.
11. (✓) Turn the meter switch one step clockwise and note that the buffer current rises when the drive control R13 is advanced about 1/3 of the distance from the counter-clockwise position. Turn the meter switch another step clockwise and note a rise in grid current when the buffer tuning control C7 is tuned to the VFO frequency. Keep the grid current below 3 ma on the 10 ma scale. If no grid current is noted check the oscillator amplifier circuit of X3 and the buffer circuit of X4.
12. () Turn the meter switch SW5 to the first step from the counter-clockwise position, the bandswitch to the third position (40 meter) from the counter-clockwise position.
13. () Repeat tests of steps 9, 10 and 11. The VFO signal should now be found within 200 kc of 6800 kc when C1 is counter-clockwise and within 200 kc of 7250 kc when C1 is clockwise. In this case, L1A should be shorted.
14. () Disconnect the power plug. Disconnect the meter, remove all tubes except those in the VFO, remove the knobs, and attach the VFO shields. Refer to

Figure 11.

- a. () Place a small drop of oil on the C1 shaft near each end bearing.
- b. () Attach the top shield, CH8, in the following steps:
 1. () Pre-tap the eight holes in the flanges of CH8 with a well lubricated 1/4" #4 binding head sheet metal screw.
 2. () Force a 7/16" OD "C" washer over each of the inner slots of the five insulated trimmer shafts, D32 (refer to Figure 10A).
 3. () Place the coupling springs and trimmer shafts over the trimmer condensers C2, C3, C4, C5 and C6 of the VFO as shown in Figure 10A while putting the top shield, CH8, in place. The springs may be distorted slightly with a pliers so that the spring is retained by the shaft slot.
 4. () Secure CH8 in place with a 1/4" 6-32 binding head screw at each of the rear posts and at the right (viewed from the front) front post. Secure at the left front post with the following hardware sequence: 1/4" 6-32 binding type screwhead, #6 teardrop (pointing toward the front), #6 shakeproof, CH8, VFO post.
 5. () Check the centering of CH8 and the assembly of each of the trimmer shafts. Remove the springs, open them slightly and reinsert if there is insufficient force against the shafts to hold the springs in place securely. Set each trimmer condenser at mid-position.
 6. () Force a 7/16" OD "C" washer over each of the outer slots of the five insulated trimmer shafts on the outside of CH8.
- c. () Prepare and attach the VFO shield, CH7, in the following steps:
 1. () Pre-tap the six holes on the flanged side of CH7 with a well lubricated 1/4" #4 binding head sheetmetal screw.
 2. () Secure six #6 spade lugs to the bottom end of CH7, the end nearer the 1/2" hole on one side, using the following sequence starting from the inside: 1/4" 6-32 binding type screwhead, CH7, spade lug, #6 shakeproof, 6-32 nut.
 3. () Slide CH7 over the VFO in such a way that the spade lugs engage the chassis holes. The 5/8" hole will be toward the front of the chassis. It may be necessary to spread the flanged end of CH7 somewhat while it is sliding over the VFO to allow the spade lug screwheads to pass over CH8 and the phenolic plate.
 4. () Secure each of the two back and two side spade lugs with a #6 shakeproof and a 6-32 nut.
 5. () Prepare C78, the 30 mfd 450 volt electrolytic condenser, by cutting the positive lead to 1 1/2" and the negative lead to 1 1/4" length. Solder a #6 teardrop to the negative lead.
 6. () Secure C78 at the front spade lugs of CH7 by mounting the C78 strap between the shakeproof and chassis on the left front (viewed from the bottom front) spade lug and the negative lead teardrop between the shakeproof and nut of the right spade lug as shown in Figure 12 while each lug is secured with a #6 shakeproof and a 6-32 nut.
 7. () Slip a 1" piece of varnished tubing over the positive lead of C78 and connect that lead to terminal 1 of X19. Solder.
 8. () Remove the positive lead of C77, the 10 mfd, 700 volt electrolytic condenser, from terminal 2 of X15 and con-

N. 14.

- c. 8. nect it to the rear terminal of the bleeder resistor R35. Solder.
- d. () Secure CH7 to CH8 with six 1/4" #4 binding head sheetmetal screws and #4 shakeproofs. Attach X33 (as shown in Figure 11) between the shakeproof and CH7 on the front screw of the right side.
- e. () Secure the short 1/4" shaft end of the planetary drive, D3, to the flexible coupling on C1, the VFO tuning condenser. Insert the screwdriver blade through the hole in the chassis just below C1 and tighten both setscrews when D3 has been positioned so that the hex shoulder extends about 1/32" beyond the chassis front surface when a straight edge is laid on the surface extended to D3. Temporarily attach the dial pointer D8, to the planetary sleeve with the 1/8" 4-40 screw. Rotate C1 to the counter-clockwise position and note the position of the end of the pointer. Now move the pointer until the rotor plates of C1 (viewed from the open side of the VFO) are as nearly exactly meshed as can be determined. Write down the length of the arc between the meshed position and the counter-clockwise position of C1. This arc length will be used to set up the dial later. It may vary from zero to 3/16". Remove the dial pointer D3. Take care in the following steps to keep from applying undue forces on the planetary drive thus impairing the coupling.
- f. () Attach spade lugs to the bottom of the side plate, CH9. The bottom has holes with 2 1/2" spacing while the holes at the top are spaced 2". Use the following sequence at each hole: 1/4" 6-32 binding type screwhead, #6 spade lug, CH9, #6 shakeproof, 6-32 nut.
- g. () Place CH9 in position (spade lugs outside) and secure the spade lugs at the bottom of the chassis with #6 shakeproofs and 6-32 nuts. Remove the outer mounting screw of X14 and move X14 out of position to reach the front spade lug. Resecure X14 after the CH9 spade lugs are tightened.
- h. () Secure CH9 to CH7 with eight 1/4" #4 binding head sheetmetal screws and #4 shakeproofs. Attach X32 (as shown in Figure 11) between the shakeproof and CH9 on the rear screw.
- i. () Secure the buffer shield, CH6, in place as shown in Figure 12 with four 1/4" #4 binding head sheetmetal screws and #4 shakeproof washers. Train the wires and components to clear the slots in CH6. Lubricate the screws before starting them into the chassis.

O. FRONT PANEL PREPARATION AND MOUNTING. Refer to Figure 9B, 10D, 11 and the illustration at the front of the brochure in the operating manual. Use a rug or soft pad to protect the panel in this part.

1. () Attach the meter and the meter shield bracket to the front panel with the hardware in the meter box. Lay the panel face down with the meter properly positioned beneath it. Place the meter shield bracket over the meter mounting studs and secure with the #4 flat washers, #4 lockwashers and 4-40 nuts.
2. () Prepare and mount the meter shield cover, CH12, as follows:
 - a. () Attach a 3 terminal strip, X27, to CH12 with hardware at each foot in the following sequence, starting from the inside. Place a 1/4" 6-32 binding head screw in the two holes. Place a #6 lockwasher on each screw, place the terminal strip on the screws, place a #6 solder lug on each screw. Place a 6-32 hex nut on each screw and tighten securely.

0. 2. b. () Place a 5/16" piece of .208 ID black insulating tubing over each meter stud.
- c. () Place CH12 over the rear of the meter M1, with the meter studs protruding through the holes in the shield. Secure CH12 in place at the meter studs with the following hardware sequence, starting at the meter shield. (CAUTION: DO NOT TIGHTEN THE NUTS EXCESSIVELY OR THE METER CASE MAY BE DAMAGED). 1/2" fiber shoulder washer (small diameter toward shield), a second 1/2" diameter shoulder washer (small diameter away from shield), 10-32 nut, (tighten until the meter shield is snug in the meter shield bracket making good contact). (Don't tighten excessively bowing the shield CH12), #10 solder lug (pointing outward) 10-32 nut. Jam the nut against the teardrop.
- d. () Connect C64, .002 mfd ceramic disc condenser, 3/4" leads, between the left terminal (viewed from the rear) of M1 and the near teardrop at X27. Solder the teardrop. Connect C65, 1002 mfd ceramic disc condenser, between the outer M1 terminal and near teardrop at X27. Solder the teardrop.
- e. () Connect one of the 19 turn VHF chokes, L28, previously made up, between the left (viewed from the rear) terminal of M1 and the left terminal of X27.
- f. () Connect another 19 turn VHF choke, L29, between the right terminals of M1 and X27. Solder the meter terminals.
3. () a. () Attach two 9/16" 4-40 cadmium plated screws to the panel in the positions shown in Figure 10D. Secure each with the following sequence, starting from the rear of the panel: Screwhead, panel, #4 shakeproof, 4-40 nut secured tightly.
- b. () Attach a #6 teardrop to the lip corner (near the upper middle of the top flange) of the panel with a 1/4" 4-40 screw, a #4 teardrop, and a 4-40 nut. Point the teardrop away from the middle tapped extruded hole.
4. () Remove the temporary mounting legs from the chassis. Save the #10 screws for a later operation.
5. () Place the 3/4" internal shakeproof washer over the planetary bushing and bring the front panel to position on the chassis. Make minor adjustments of bushing position if necessary and secure the panel to the 3/8" bushings with 3/8" -32 nuts. Secure the planetary to the panel with the 3/4" -20 nut. If undue strain is noted on the planetary coupling as the panel nut is tightened, loosen the coupling setscrews (through the chassis hole) and reposition the planetary shaft.
6. () Push the 3/16" diameter metaltex braid, CH15, between the panel strips and the flange (as shown in Figure 9B) and between the panel flange and chassis lip. Start at the middle of the lower flange and push the braid in place with a screwdriver - taking care to train the braid fully and smoothly around the corners for good electrical seal. Cut off any excess after the braid has been brought completely around and has been trained fully in every corner.
7. () Connect and solder the free red lead from the meter switch, SW5, to the left terminal of X27 (viewed from the rear in Figure 9B). Connect and solder the black lead to the right terminal of X27.
8. () Place a #51 mazda lamp in each of the three sockets, I1, I2 and I3.

0. 9. () Connect C80, C81, and C82, each a .005 mfd disc ceramic condenser, to I1, I2, and I3, respectively as follows:
- a. () Cut the leads of each to 5/8".
 - b. () Connect each condenser between the solder lug on the contact rivet and the socket shell. Make the shell connection by soldering the condenser lead directly to the shell just beyond the barrel rib. Scrape the plating off a small area if the plating does not accept solder.
 - c. () Move the keyer plate aside to permit access to SW4.
10. () Place the pilot light assemblies I1, I2, and I3 in the 5/8" holes on the panel and meter shield. Connect the 19 turn VHF chokes L30, L31 and L32 as follows. Refer to Figure 9B and Figure 11.
- a. () L30 between the insulated terminal of X33 and the solder lug on I3. Solder at I3.
 - b. () L31 between the insulated terminal of X33 and the solder lug on I2. Solder at the solder lug and X33.
 - c. () L32 between the insulated terminal of X32 and the solder lug on I1. Solder at the solder lug and X32.
11. () Prepare the dial as shown in Figure 9C in the following steps:
- a. () Secure the dial plate, D5, to the inside of the escutcheon, D4, as shown with the two jewels D9A and D9B and a 9/32" -27 nut on each jewel, jammed against D5.
 - b. () Place the rubber gasket, D6, around the edge of D4 and cut off any excess. The gasket should meet at the bottom of D4.
 - c. () Apply the rubber weatherstrip light blocks as shown in Figure 9C, making certain that there is over 3/16" of distance between the arc of the escutcheon opening and the light block rubber. The dial pointer will move in this area later.
 - d. () Turn on another 9/32" -27 spacing nut on each of the jewels until the upper surface (viewed from the inside of the escutcheon) of the nut is just 1/32" below the level of a straight edge held across the gasket of D4.
 - e. () Place a 4-40 nut on each of the 9/16" screw extensions on the front panel. Turn each nut on until the front surface of the nut is exactly 5/16" from the surface of the panel.
 - f. () Place the dial pointer, D8, over the planetary sleeve. The rivet head at the top of the pointer should be outward. Leave 1/32" clearance between the 3/4" bushing on the planetary drive and the pointer hub. Secure the hub to the sleeve with the pointer on the left side-space below the horizontal position by the arc length measured and noted in step N14d, when VFO condenser, C1 is in the most counter-clockwise position.
 - g. () Place the dial assembly in position on the panel and secure it in place with 4-40 nuts over the 9/16" 4-40 screws, a 9/32" -27 nut on the left jewel, and the pilot light bracket, I4, and a

0. 11. g. () 9/32" -27 nut at the rear of the panel on the right jewel. Place a #51 lamp in I4 and bend the bracket to bring the lamp as near the jewel opening as possible.
12. () Connect the teardrop at the lip near the middle of the upper flange of the front panel to the teardrop on the upper, front, left corner of the VFO with a 1 1/4" doubled piece of #20 tinned wire (2 1/2" total length). Solder at both teardrops.
13. () Inspect all of the chassis carefully, looking for obvious mistakes, unsoldered connections, touching uninsulated leads, or omissions. Train any looped leads near the chassis to prevent pickup in the harness and tie any loose leads to the harness with lacing cord or tape.
14. () Letter "High Voltage" warnings on the upper part of the meter shield, on the chassis near the high voltage bleeder resistor, R35, the auxiliary socket shield X13C and on the topside of the chassis near the Final RF choke, L10, and near the Operate switch, SW4. Decals or pressure sensitive marking tapes may be used for greater neatness.
15. () Place a small drop of oil on each condenser, switch, planetary, and panel bearing.
16. () Place the keyer control unit on the three aluminum spacers D36, 37, 38. Secure with three 1/4 x 6-32 binding head screws and #6 shakeproof washers.

P. TRANSMITTER TEST.

1. () Attach the knobs as follows at each panel position.
- a. () Operate - 1 1/8" knob, 3/16" 8-32 setscrew and a 1/4" deformed washer making contact between the knob and bushing. The white indicator on "Off" when the operate switch is counter-clockwise.
 - b. () Buffer - 1 1/8" 100-0 dial knob and a 3/16" 8-32 setscrew. The green indicator should be aligned on "0" when the buffer condenser is meshed. Set so that the skirt just clears the 4-40 nut.
 - c. () Final - 1 1/8" 100-0 dial knob and 3/16" 8-32 setscrew. The green indicator should be aligned on "0" when the final condenser is meshed. Set so that skirt is clear of 4-40 nut.
 - d. () Meter - 1 1/8" knob, 3/16" 8-32 setscrew and a 1/4" deformed washer. Indicator on "Off" when the meter switch is counter-clockwise.
 - e. () Drive - 1 1/8" knob, 3/16" 8-32 setscrew and a 1/4" deformed washer. Indicator on "0" when the drive control is counter-clockwise.
 - f. () Crystal - VFO - 1 1/8" knob, 3/16" 8-32 setscrew and 1/4" deformed washer. Indicator on "Xtl" when the Crystal-VFO switch is counter-clockwise.
 - g. () Crystals - bend the fingers of the 1 1/2" plug button inward until the plug can be inserted into the crystal well hole while still providing good electrical contact at least five or six places around the hole. Make certain all of the contacts are free of paint to assure good electrical contact. This cover must be on when the transmitter is in the cabinet to insure good TVI rejection.
 - h. () Band - 1 5/8" knob, 3/16" 10-32 setscrew, and a 1/4" deformed washer. Indicator on "160" when the bandswitch is in the most counter-clockwise position. Set the setscrew very tightly.

- P. 1.
- i. () Auxiliary coupling - 1 1/8" knob, 3/16" 8-32 setscrew, and a 1/4" deformed washer. Indicator on "1" when the coupling switch is counter-clockwise.
 - j. () Coupling - 1 1/8" knob, 3/16" 8-32 setscrew, and a 1/4" deformed washer. Indicator on "0" when the coupling condenser is meshed.
 - k. () Audio - 1 1/8" knob, 3/16" 8-32 setscrew, and a 1/4" deformed washer. Indicator on "0" when the audio control is counter-clockwise.
 - l. () VFO - 2 1/8" knob and a 3/16" 10-32 setscrew. Place star spring on shaft with fingers toward knob. Push the knob on the shaft as far as it will go - clearing the dial escutcheon.
2. () Place tubes in the sockets as shown in Figure 11 as listed below:
- a. () V3 - 6CL6, Oscillator - Multiplier.
 - b. () V4 - 6CL6, Buffer.
 - c. () V12 - 6AX5GT, Low Voltage Rectifier.
 - d. () V11 - 5R4GY, High Voltage Rectifier.
 - e. () V5 - 6146, Final Amplifier.
 - f. () V9 and V10 - 1614, Modulators.
 - g. () V8 - 12AU7, Audio Driver.
 - h. () V7 - 12AX7, Speech Amplifier.
 - i. () V6 - 6AQ5, Clamper Tube.
 - j. () V13 - 12AU7, Keyer Control Tube.
 - k. () V14 - 6AL5, Bias Rectifier.
3. () Place 160 or 80 meter crystal (243 type or similar holder) in the crystal socket position XT1 and a 40 meter crystal at XT2 as shown in Figure 10D. Loop a 3 1/2" x 1/2" friction, masking or plastic tape around each crystal to form a pull out tab as shown in Figure 10D.
4. () Set the controls in the listed positions:
- a. () Operate - Off
 - b. () Drive - 0
 - c. () Crystal - VFO - on VFO
 - d. () Band - 40
 - e. () Auxiliary Coupling - 1
 - f. () Coupling - 0
 - g. () Audio - 0
 - h. () Meter - Osc.
 - i. () VFO pointer on 7 mc.
5. () Connect a 60 watt or 100 watt lamp bulb to the output of the transmitter at J3 with short (less than 2 ft.) leads or a short piece of coaxial cable. A banana plug may serve as a connector to J3 and the ground screw can be used if a coax connection is inconvenient.
6. () Check the transmitter on 40 meters as outlined below. The other bands, will be similar and will require little further discussion. Typical voltage, current and resistance values are given in the operating manual.
- a. () Plug J4 into an AC receptacle, 117 volts.
 - b. () Turn "Operate" to "Tune" - note that all tubes light.
 - c. () Turn "Meter" to "Buff" - note rise in current as "Drive" is advanced about 1/3 clockwise.
 - d. () Turn "Meter" to "Grid" - tune "Buffer" control for maximum grid current. Well over 4 ma. should be available when "Drive" is advanced. Set drive for 2.5 ma.
 - e. () Turn "Meter" to "Plt". Place the right hand on the "Final" control to locate it. Turn "Operate" to "Phone" and turn "Final"

- P. 6.
- e. quickly until the dip in plate current is reached. Turn the "Auxiliary Coupling" until over 100 ma but less than 130 ma of plate current is noted, retune "Final" and turn "Coupling" until 130 ma of plate current is noted. Retune the Final for dip again. A moderate spitting will be noted at the "Operate" switch when it is turned to or from the "Phone" position. This is harmless unless the switch is turned very slowly. Turn the operate switch without hesitating.
 - f. () Turn the "Meter" to "Grid", retune "Buffer", and adjust "Drive" for 2.5 ma grid current.
 - g. () Turn "Meter" to "Mod." The reading should be between 55 to 70 ma. If it is out of these limits, turn "Operate" to "Off", pull out the AC plug, discharge the rear terminal of the high voltage bleeder R35 to the chassis with an insulated screw driver and adjust the tap of R35 carefully (loosening the tap screw adequately to prevent breaking the resistance wire) toward the rear to increase the modulator current or toward the front to decrease it. Turn "Operate" to "Tune" for warmup and again to "Operate" to check the mod current.
 - h. () Plug in a crystal or a high impedance, communications type dynamic microphone into the two contact mike jack, J1. The microphone plug should previously have been made up to correspond to J1 as shown in the schematic diagram, Figure 8. Turn the "Audio" control up and speak into the microphone. Upward modulation should be indicated by the load lamp becoming brighter when modulation is applied. Peak swings of 120 to 130 ma of plate current corresponds to 100 percent modulation.
 - i. () Turn "Meter" to "Plt.". Turn "Operate" to "Standby". Note that the VFO signal can be picked up by a receiver for zero beat purposes when the "Crystal-VFO" switch is turned to "Zero."
 - j. () Turn "Crystal-VFO" to "VFO" and the "Operate" to "CW". The modulator current should be nearly zero. The "Plt" current indication on the meter should be between 30 and 50 ma. A high current indicates improper clamper tube operation. This current is primarily screen clamper current. Plug a key into the key jack, J2. Check the keying of the transmitter, noting that the plate current rises when the key is pressed.
 - k. () Repeat steps d and e at the other end of the 40 meter band, 7.3 mc.
 - l. () Turn "Operate" to "Tune" and "Crystal-VFO" to "XT2". Repeat tests of steps d, e and f.
 - m. () Repeat tests of steps d, e and f for all bands (using a middle setting on the VFO) with the following three exceptions:
 - 1. () Set "Crystal-VFO" on "XT1" on the 80 and 160 meter bands.
 - 2. () Make the initial setting of "Auxiliary Coupling" "6" instead of "1" on 20, 15, 10 and 11 meters. This is important on the 15, 10 and 11 meter bands.
 - 3. () The grid drive on 10 and 11 meters may be initially low until the L5 slug is adjusted. Peak the grid current at the vicinity of 28 mc by turning the L5 slug.
7. () Keyer control adjustment.
- a. () Couple the VFO output to a receiver.
 - b. () Close key and tune receiver to VFO signal.
 - c. () Open key.
 - d. () Turn VFO keyer adjust control, R39, counter-clockwise until VFO signal starts.

- P. 7. e. () Turn VFO keyer adjust control clockwise just slightly beyond the point at which the VFO signal stops. Adjustment in the extreme clockwise position may cut off the VFO too soon and result in "squaring" or "sharpening" of the keying envelope at the break with attendant clicks.
8. () Calibrate the VFO as instructed in Section E of the operating manual for the Viking Ranger. The following suggestions apply if difficulty is experienced in tracking the VFO:
- a. () Check the calibrating standard settings carefully. If crystals are used, check the crystal frequencies carefully before attempting further calibration. Make certain that the receiver used is tuned to the proper signal rather than an image.
 - b. () Recheck the meshing to the VFO condenser with the left side horizontal position of the dial pointer.
 - c. () If the C2 trimmer or C3 padder are in position indicating that less capacity is required, the end turns of the spaced wound 40 meter VFO coil may be spread and recemented.
 - d. () If the C5 trimmer or C6 padder are in a position indicating that less capacity is required, the end turns of the close wound 160 Meter VFO coil may be pushed away from the coil and recemented.
 - e. () If any trimmer or padder appears to require more capacity a 5, 6, 8 or 10 mmf low temperature coefficient, tubular ceramic silvered or mica condenser may be connected across the trimmer. These condensers are not supplied with the kit as they will very rarely be needed.
9. () Readjust L5 for maximum grid current at 28 mc.

Q. CABINET ASSEMBLY.

- 1. () Attach the two rails and the four mounting feet to the bottom (the side with four holes) of the cabinet as indicated in Figure 10C. The slanting side of each rail must be oriented toward the rear side of the cabinet.
- 2. () Place a #10 external tooth shakeproof on each of the three 1 1/8" tie bolts and insert the tie bolts in the upper holes of the cabinet on through the support brackets near the front.
- 3. () Place the back of chassis on the front of the cabinet rails and slide the chassis in the cabinet, pulling the power cord through the rear cutout.
- 4. () Engage the three tie rods in the front panel strip tapped holes and pull up the tie rods until the panel nearly covers the front cabinet offset.
- 5. () Secure the chassis to the rear of the cabinet with the eight 1/2" 10-24 (or 10-32) truss head screws and eight #10 external shakeproof washers. Lubricate each of the eight holes with a little vaseline or similar lubricant before self tapping the thread at each hole. Draw up the tie bolts until the panel covers the cabinet offset evenly.
- 6. () A small ceramic plug, J5B, will be found unused after the assembly is completed. Save this plug for later relay connection to J5 if an antenna relay is installed.

Refer to the Operating Manual for circuit descriptions, operating instructions and typical voltage, current and resistance values.

NOTE: Excess hardware, wire, etc., is supplied in the RANGER kit. Do not worry about these excess items if the Assembly instructions have been rigorously followed.

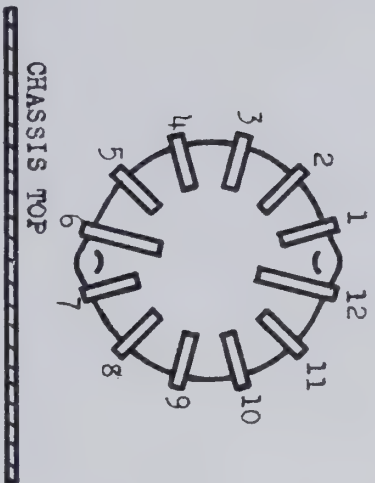


FIG. 5A. SW5, METER SWITCH, REAR VIEW

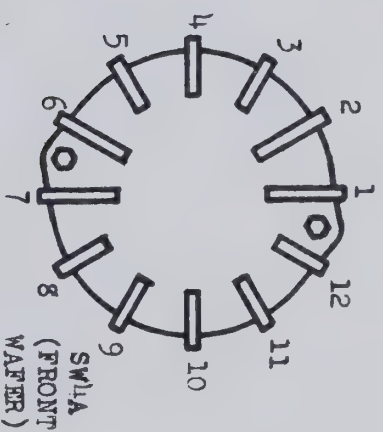


FIG. 5B. SW4, OPERATE SWITCH

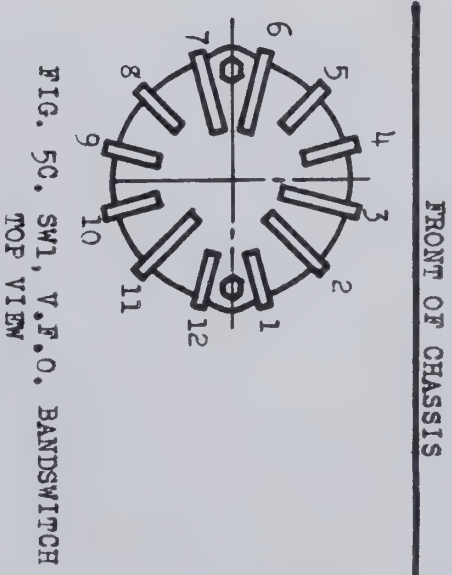


FIG. 5C. SW1, V.F.O. BANDSWITCH

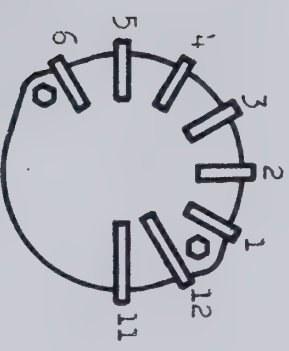


FIG. 5D. SW6, COUPLING SWITCH, REAR VIEW, BOTTOM SIDE OF CHASSIS UP

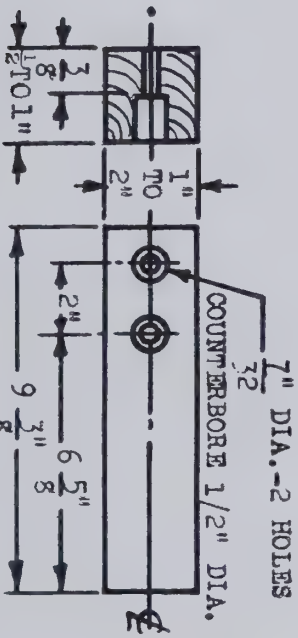


FIG. 5E. SW3, BANDSWITCH, REAR VIEW, BOTTOM SIDE OF CHASSIS UP

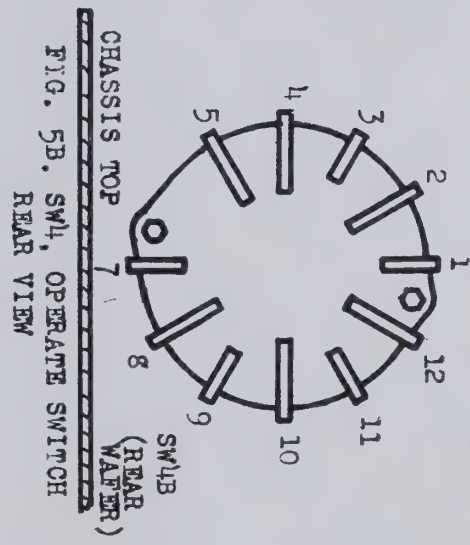


FIG. 5F. TEMPORARY MOUNTING LEGS

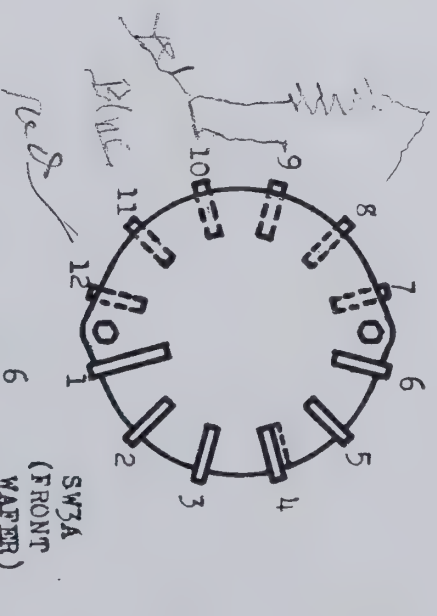


FIG. 5G. SW2, BANDSWITCH, REAR VIEW, BOTTOM SIDE OF CHASSIS UP

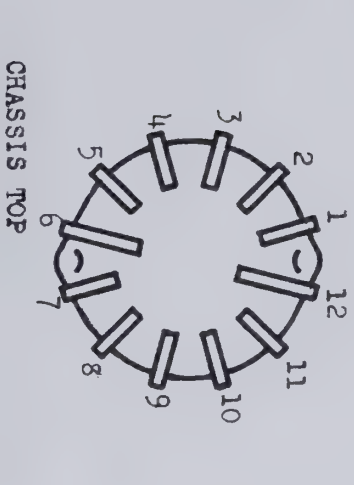


FIG. 5A. SW5, METER SWITCH, REAR VIEW

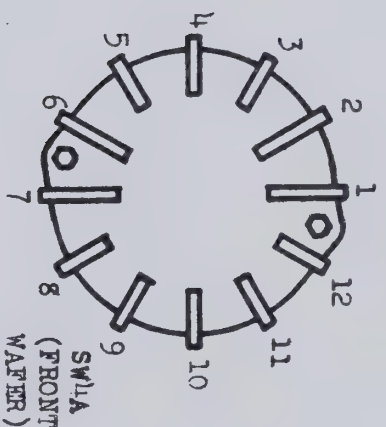


FIG. 5B. SW4, OPERATE SWITCH
CHASSIS TOP
REAR VIEW

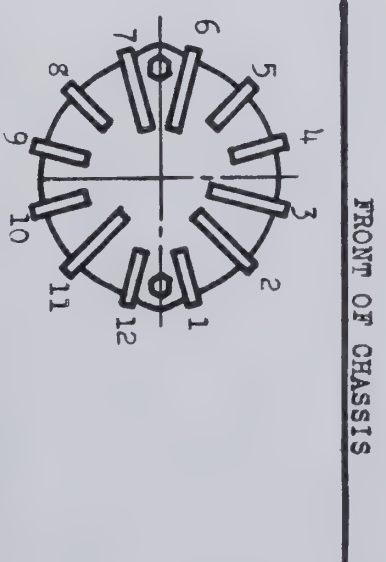


FIG. 5C. SW1, V.F.O. BANDSWITCH
FRONT OF CHASSIS
TOP VIEW

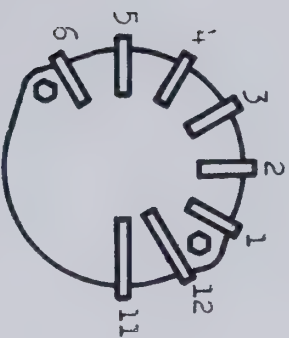


FIG. 5D. SW6, COUPLING SWITCH, REAR
VIEW. BOTTOM SIDE OF
CHASSIS UP

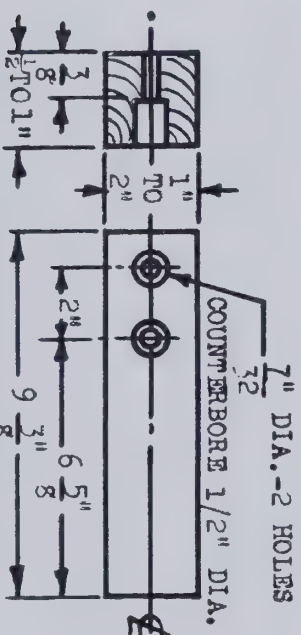


FIG. 5F. TEMPORARY MOUNTING LEGS

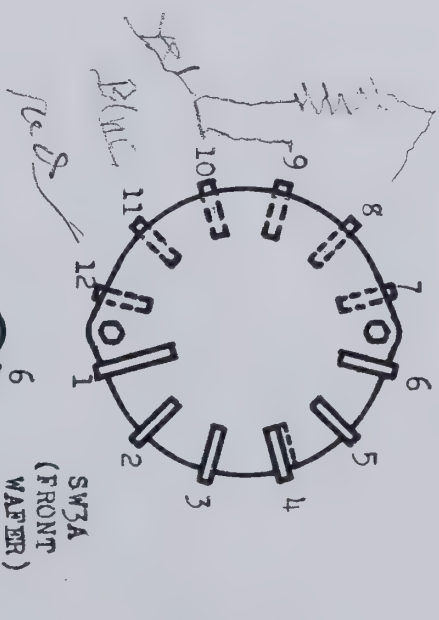


FIG. 5E. SW3, BANDSWITCH, REAR VIEW.
BOTTOM SIDE OF CHASSIS UP

CHASSIS TOP

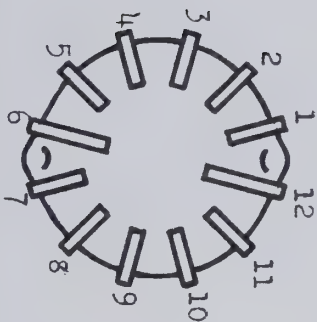


FIG. 5A. SW5, METER SWITCH, REAR VIEW

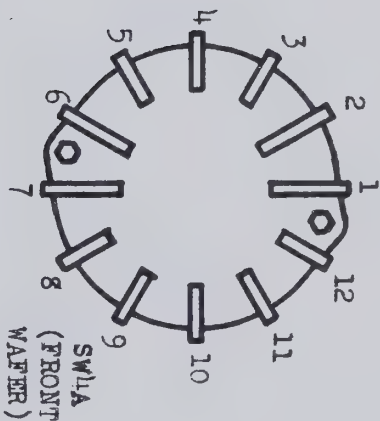


FIG. 5C. SW1, V.F.O. BANDSWITCH
TOP VIEW

FRONT OF CHASSIS

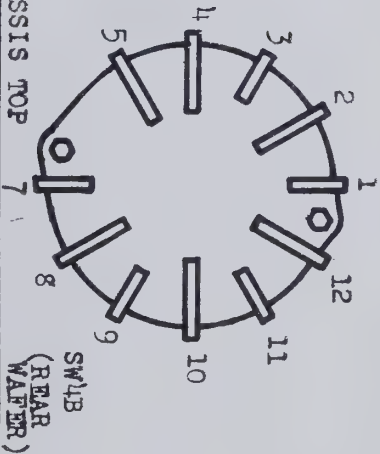


FIG. 5B. SW4, OPERATE SWITCH
REAR VIEW

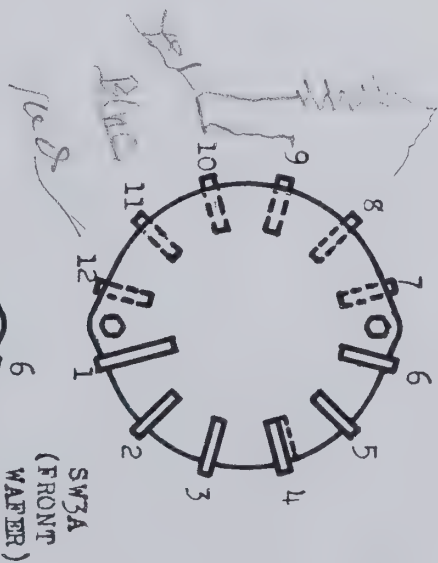


FIG. 5E. SW3, BANDSWITCH, REAR VIEW.
BOTTOM SIDE OF CHASSIS UP

BOTTOM SIDE OF CHASSIS

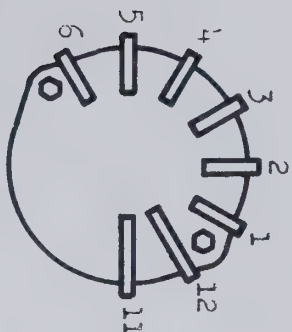


FIG. 5D. SW6, COUPLING SWITCH, REAR
VIEW. BOTTOM SIDE OF
CHASSIS UP

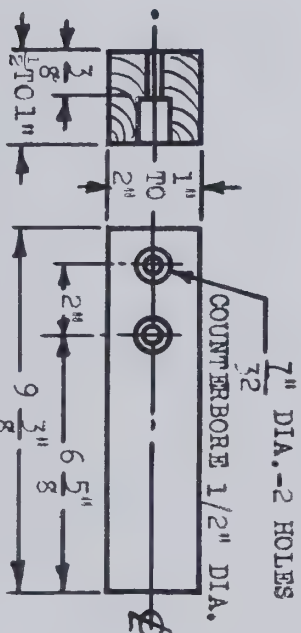


FIG. 5F. TEMPORARY MOUNTING LEGS

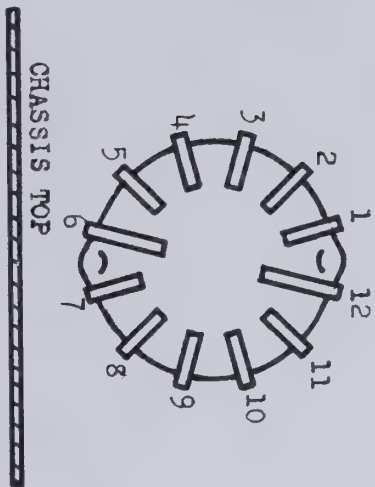


FIG. 5A. SW5, METER SWITCH, REAR VIEW

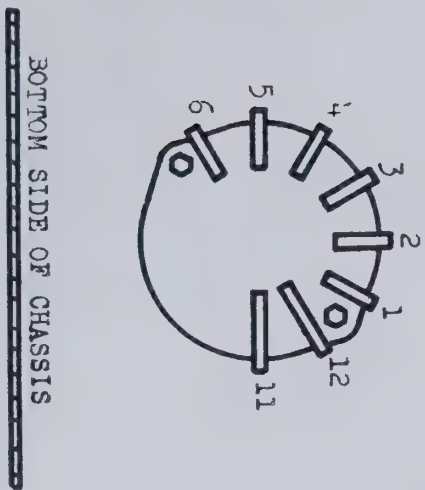
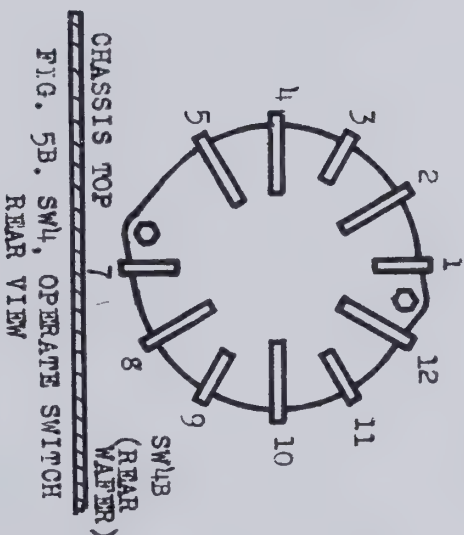
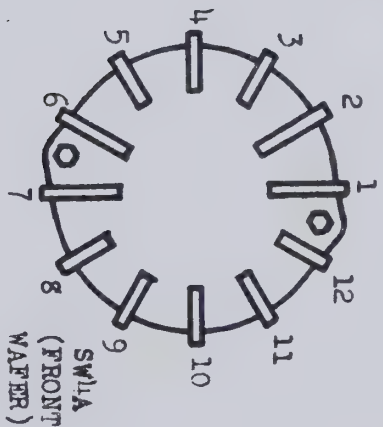
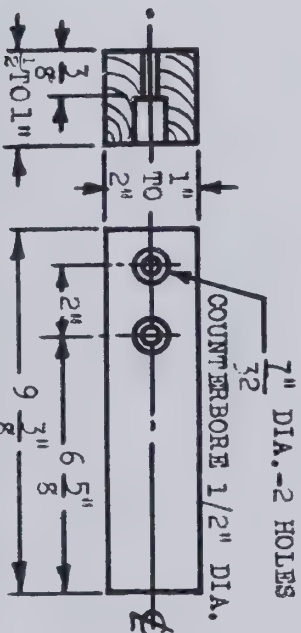


FIG. 5D. SW6, COUPLING SWITCH, REAR VIEW, BOTTOM SIDE OF CHASSIS UP



FRONT OF CHASSIS

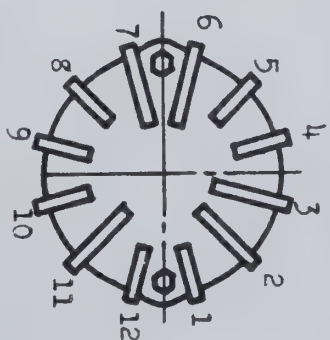


FIG. 5C. SW1, V.F.O. BANDSWITCH TOP VIEW

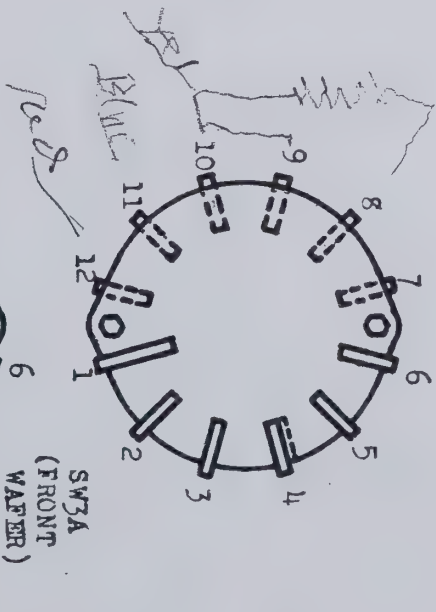


FIG. 5E. SW3, BANDSWITCH, REAR VIEW, BOTTOM SIDE OF CHASSIS UP

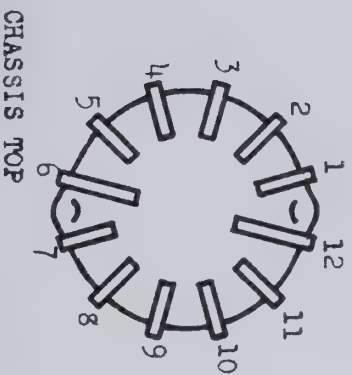


FIG. 5A. SW5, METER SWITCH, REAR VIEW

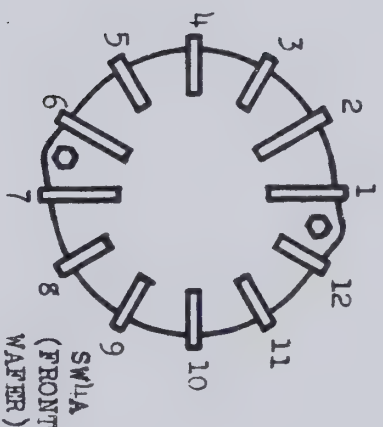


FIG. 5B. SW4, OPERATE SWITCH

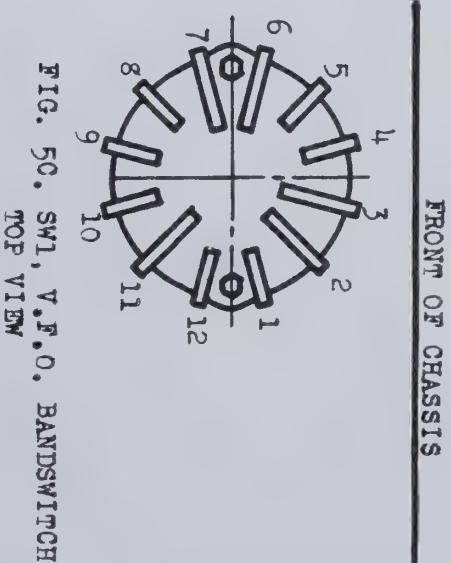


FIG. 5C. SW1, V.F.O. BANDSWITCH

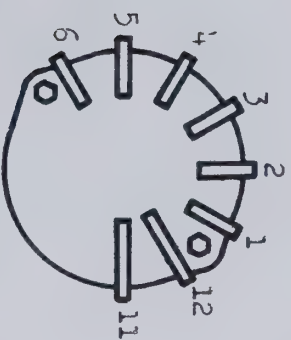


FIG. 5D. SW6, COUPLING SWITCH, REAR VIEW. BOTTOM SIDE OF CHASSIS UP

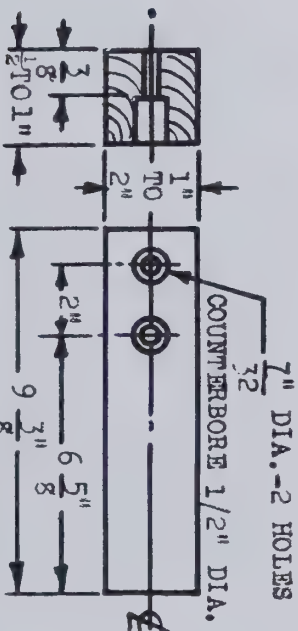


FIG. 5E. SW3, BANDSWITCH, REAR VIEW. BOTTOM SIDE OF CHASSIS UP

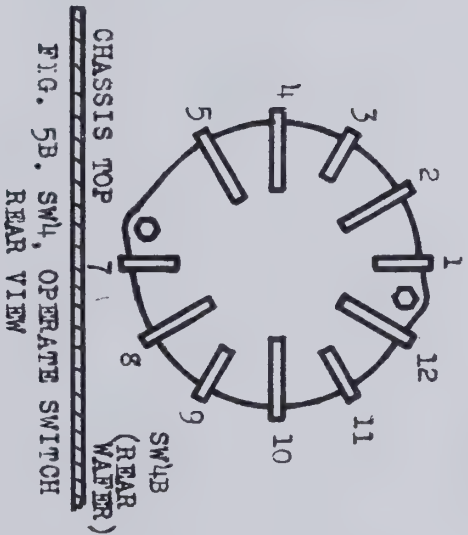


FIG. 5F. TEMPORARY MOUNTING LEGS

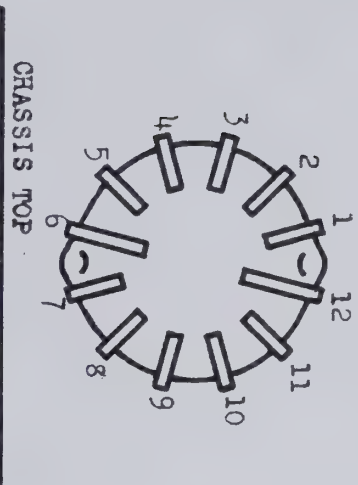


FIG. 5A. SW5, METER SWITCH, REAR VIEW

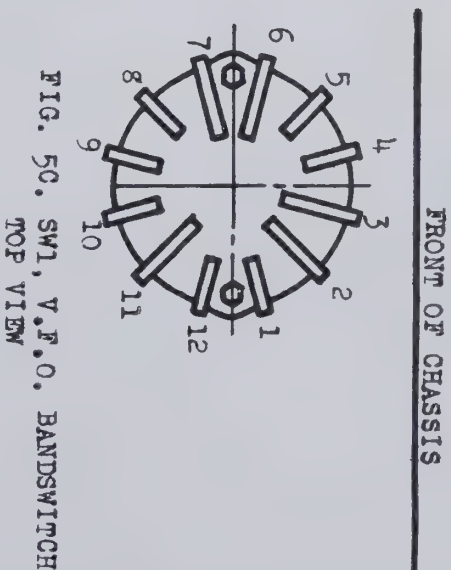
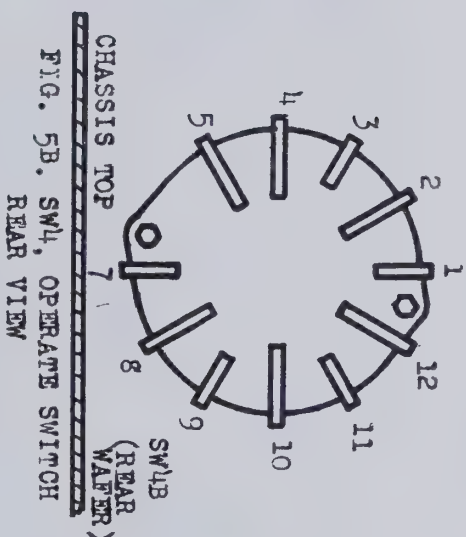
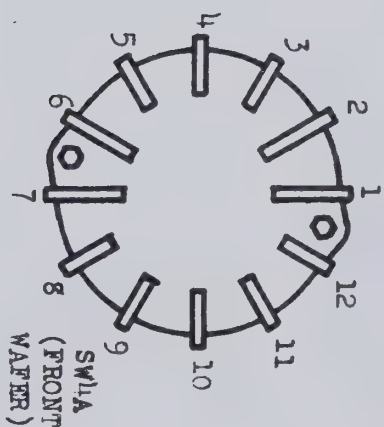


FIG. 5C. SW1, V.F.O. BANDSWITCH, TOP VIEW

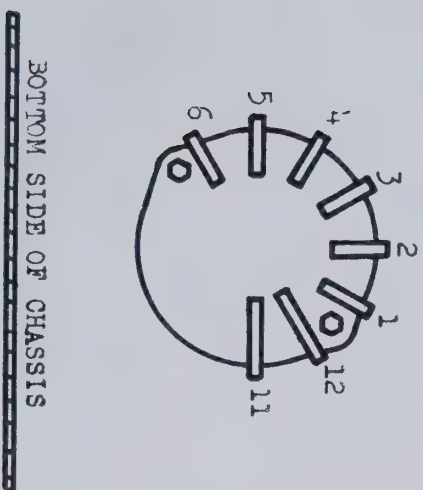


FIG. 5D. SW6, COUPLING SWITCH, REAR VIEW. BOTTOM SIDE OF CHASSIS UP

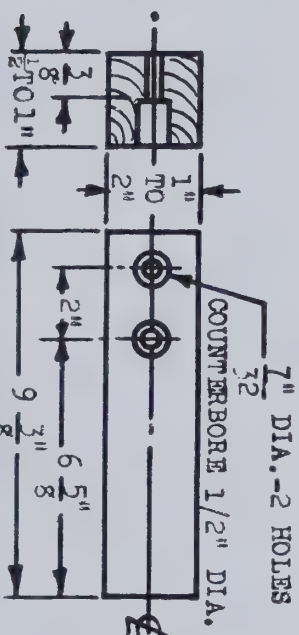


FIG. 5F. TEMPORARY MOUNTING LEGS

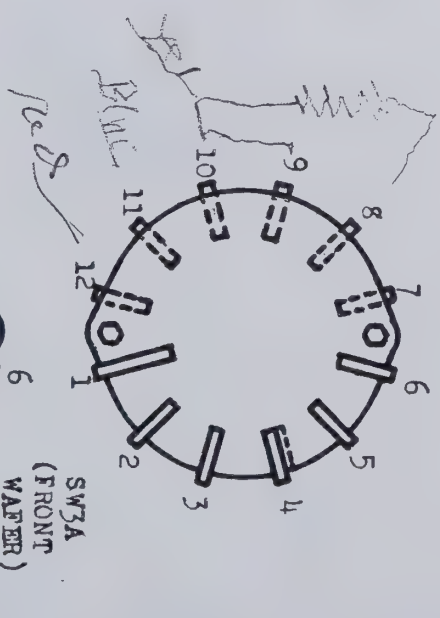
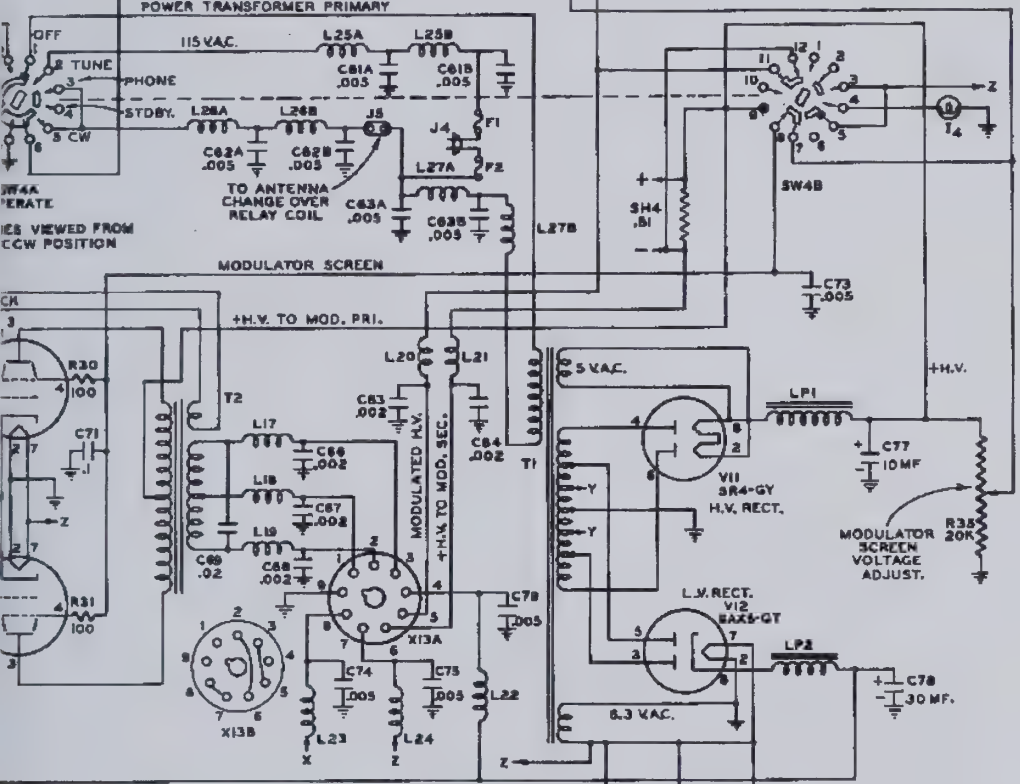
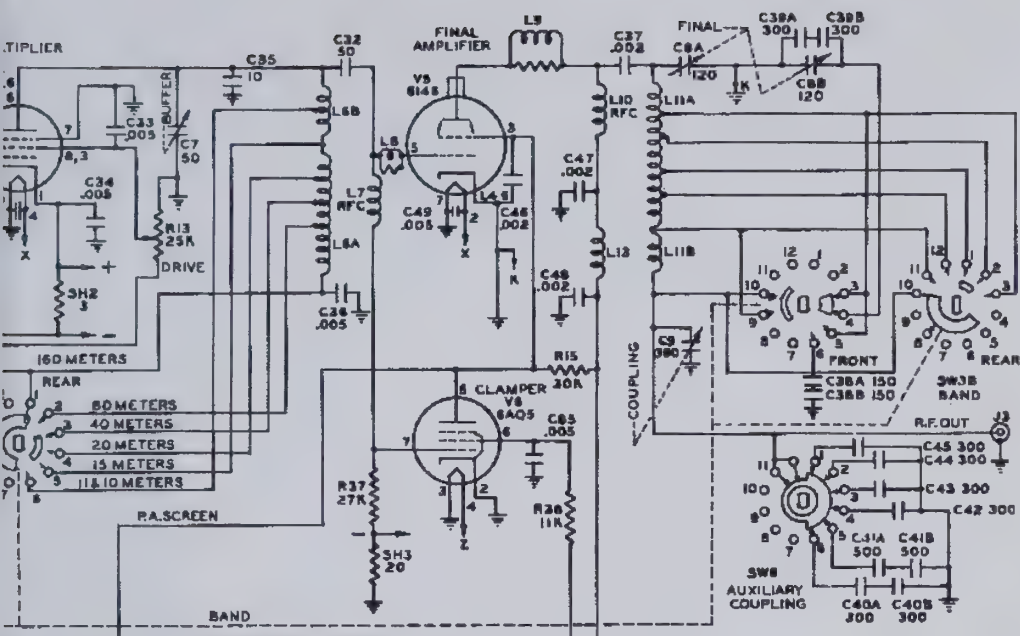
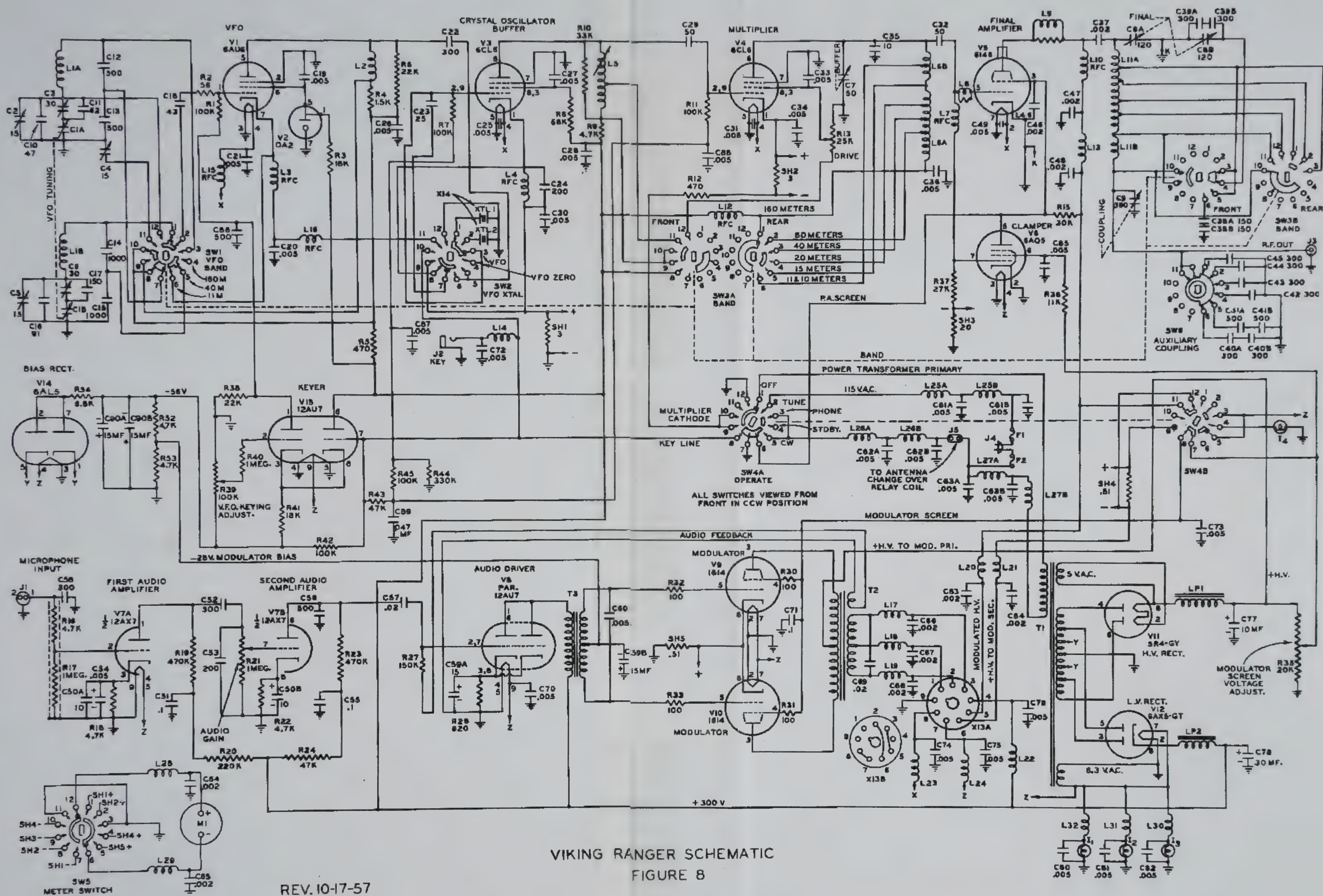
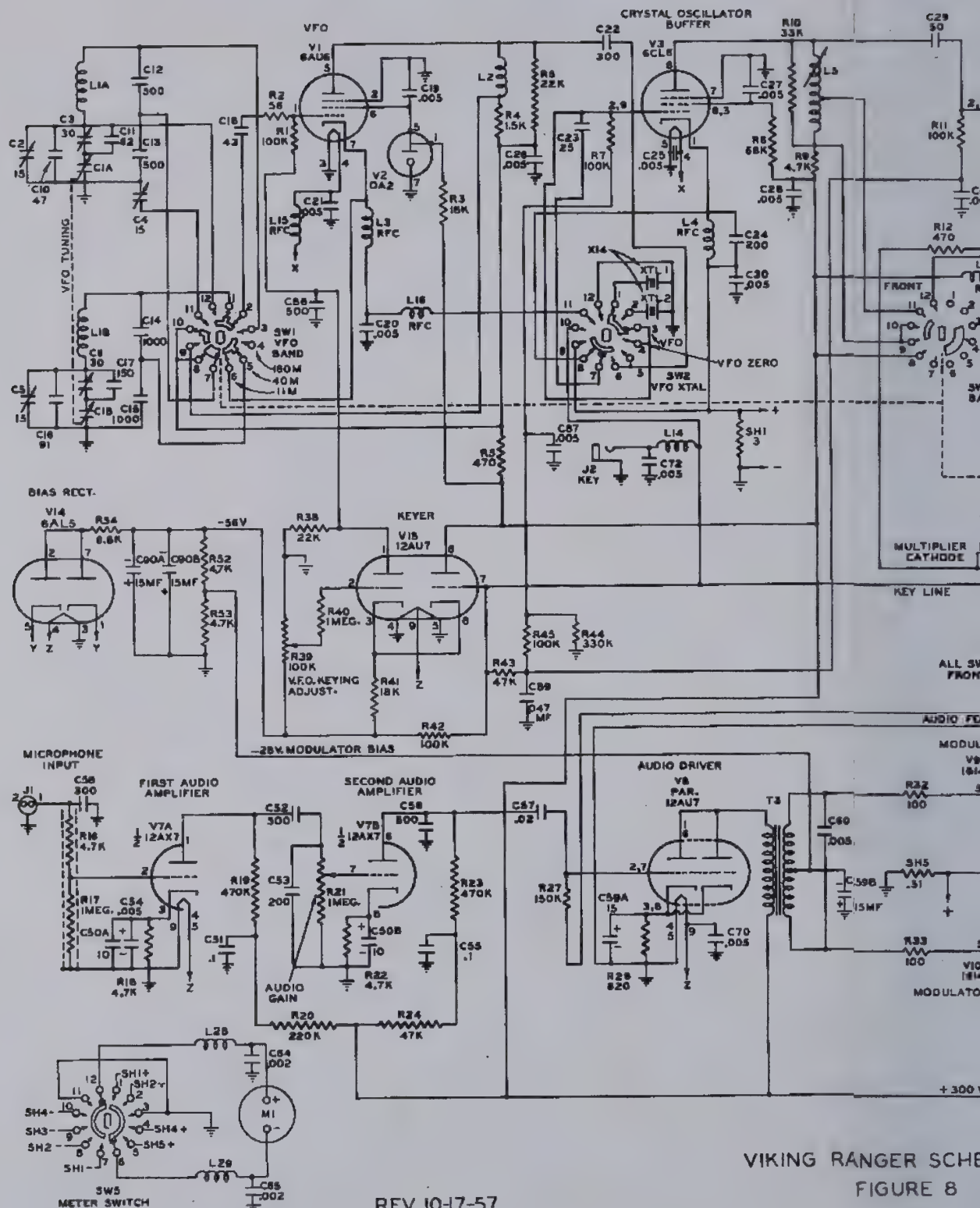


FIG. 5E. SW3, BANDSWITCH, REAR VIEW. BOTTOM SIDE OF CHASSIS UP





REV. 10-17-57



VIKING RANGER SCHE
FIGURE 8

REV. 10-17-57

FRONT OF CHASSIS

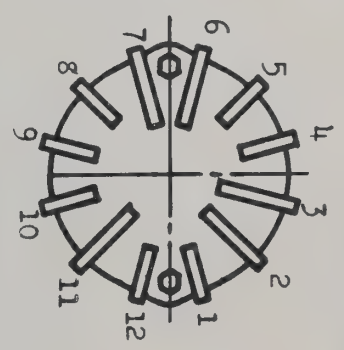


FIG. 5C. SW1, V.F.O. BANDSWITCH TOP VIEW

CHASSIS TOP

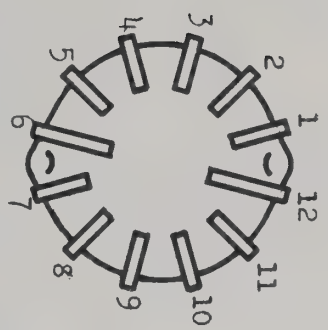


FIG. 5A. SW5, METER SWITCH, REAR VIEW

CHASSIS TOP

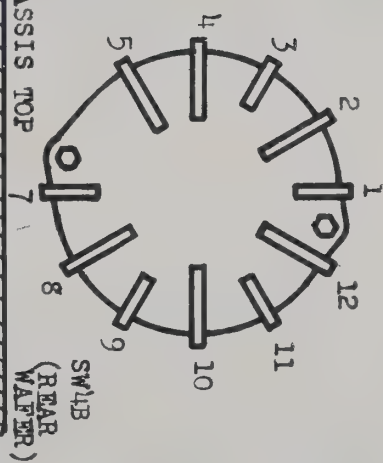


FIG. 5B. SW4, OPERATE SWITCH REAR VIEW

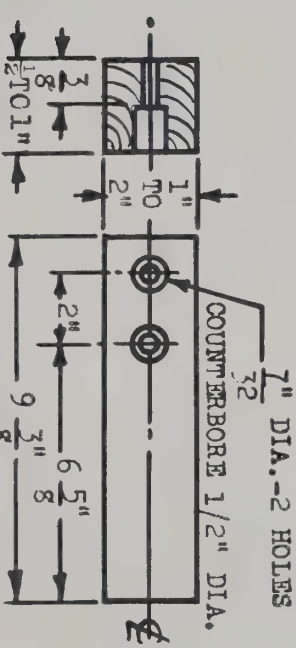
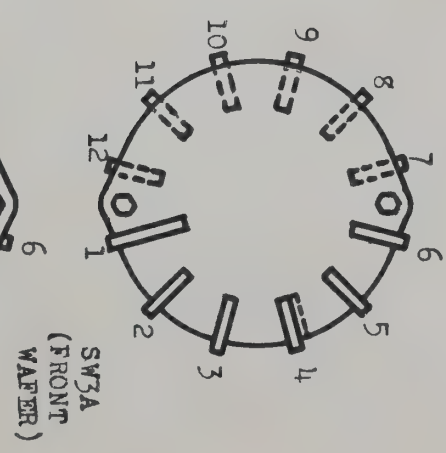
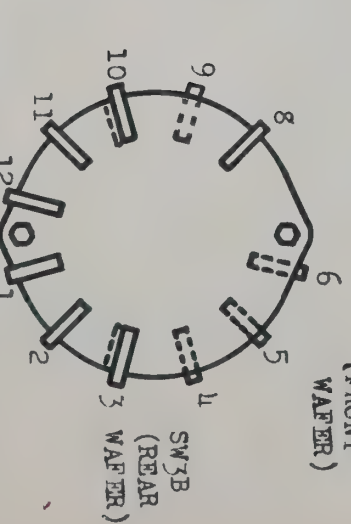


FIG. 5F. TEMPORARY MOUNTING LEGS



BOTTOM SIDE OF CHASSIS

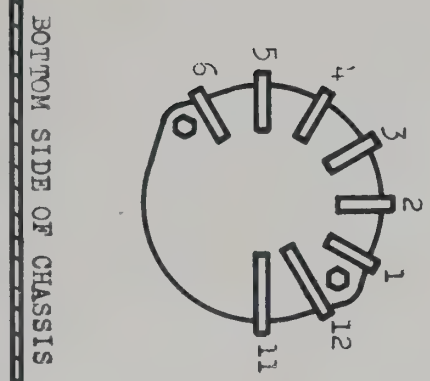


FIG. 5D. SW6, COUPLING SWITCH, REAR VIEW. BOTTOM SIDE OF CHASSIS UP

FIG. 5E. SW3, BANDSWITCH, REAR VIEW. BOTTOM SIDE OF CHASSIS UP

FIGURE 6B. V.F.O. CHASSIS BOTTOM VIEW.

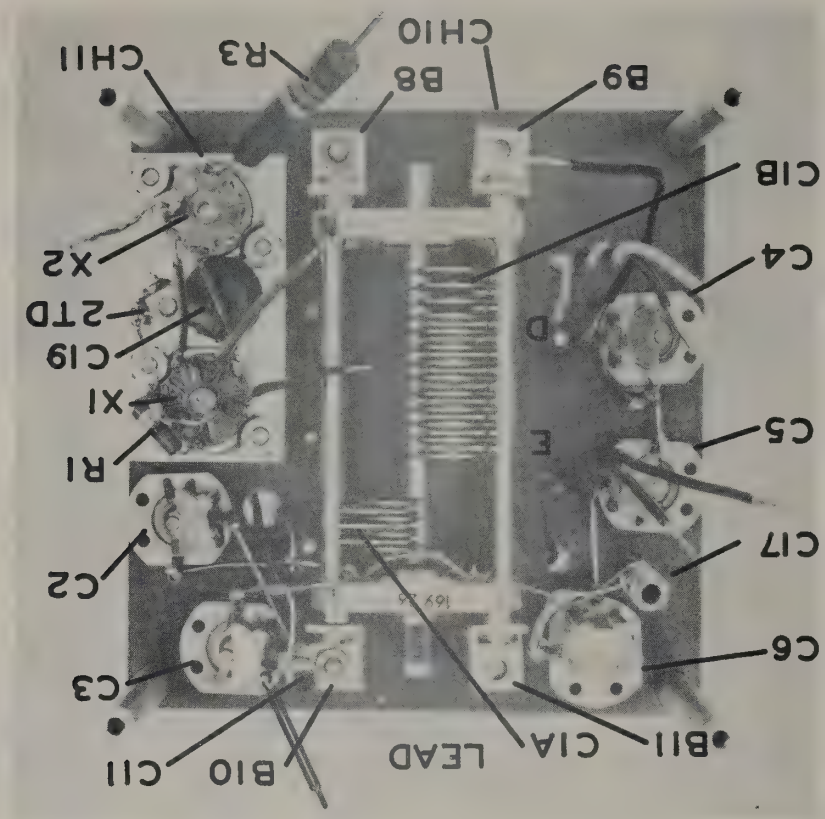
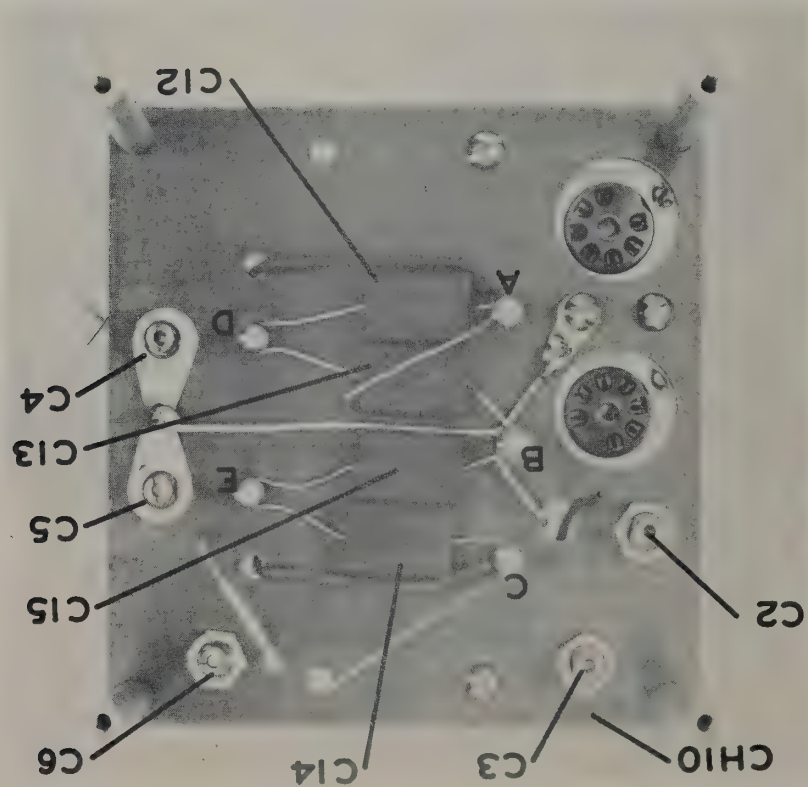
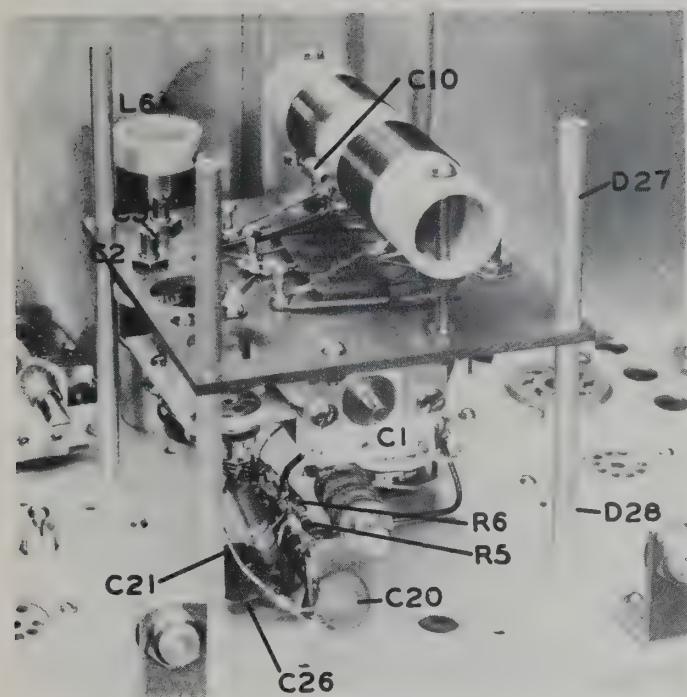
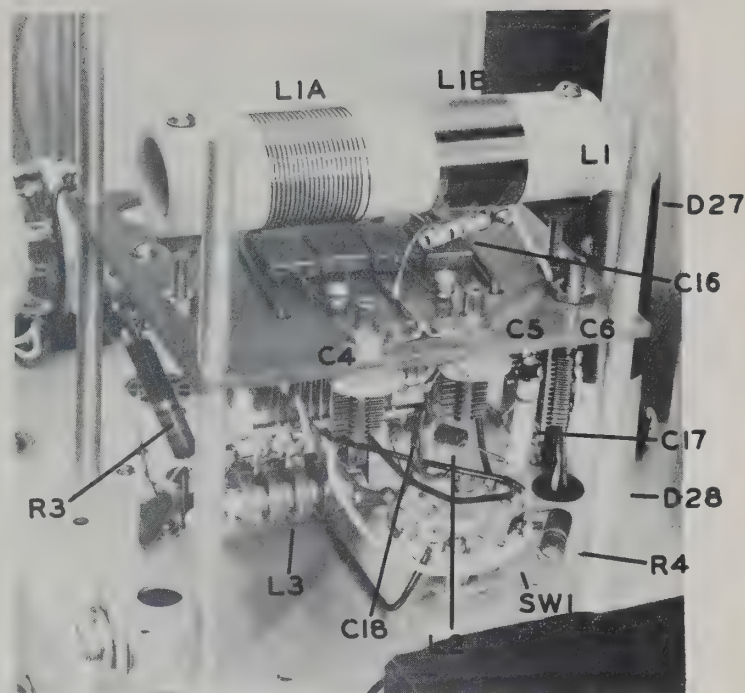


FIGURE 6A. V.F.O. CHASSIS TOP VIEW.





LEFT VIEW



RIGHT VIEW.

FIGURE 7A. V.F.O. MOUNTED

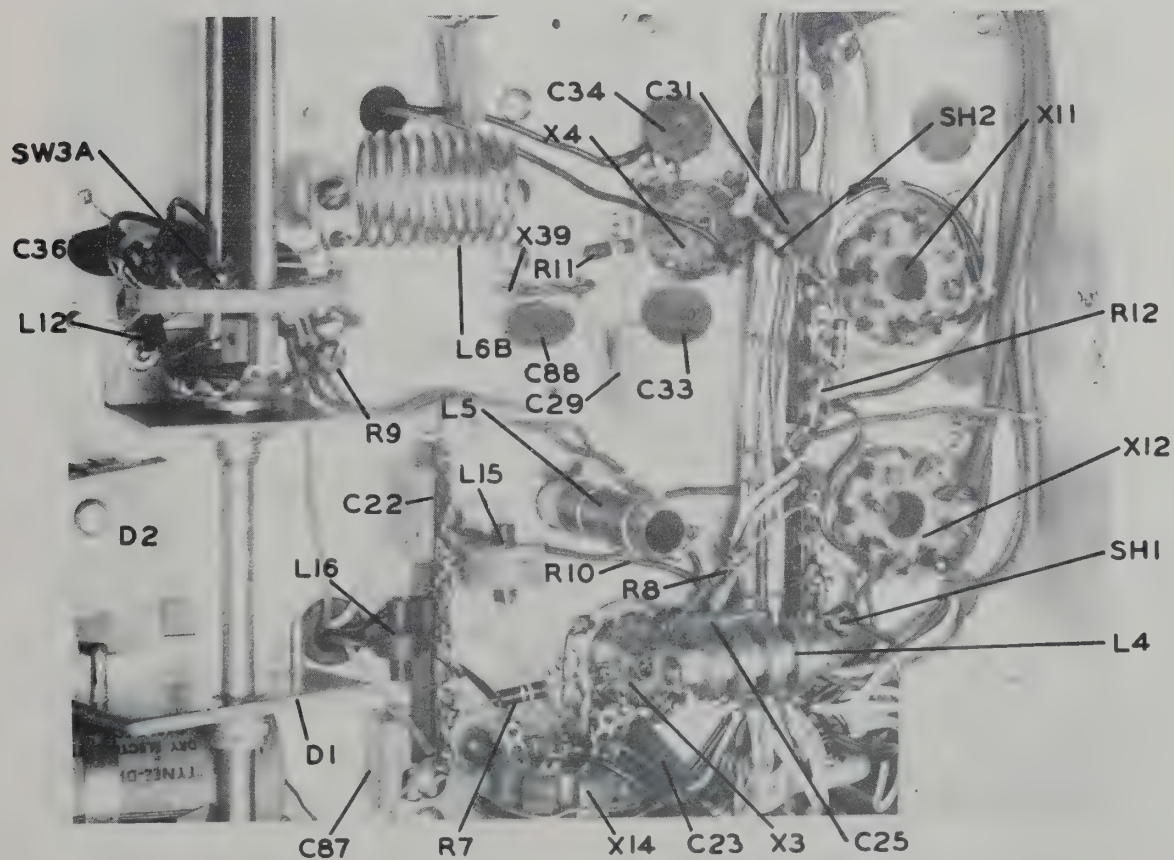


FIGURE 7B. R.F. EXCITER SECTION BOTTOM VIEW.

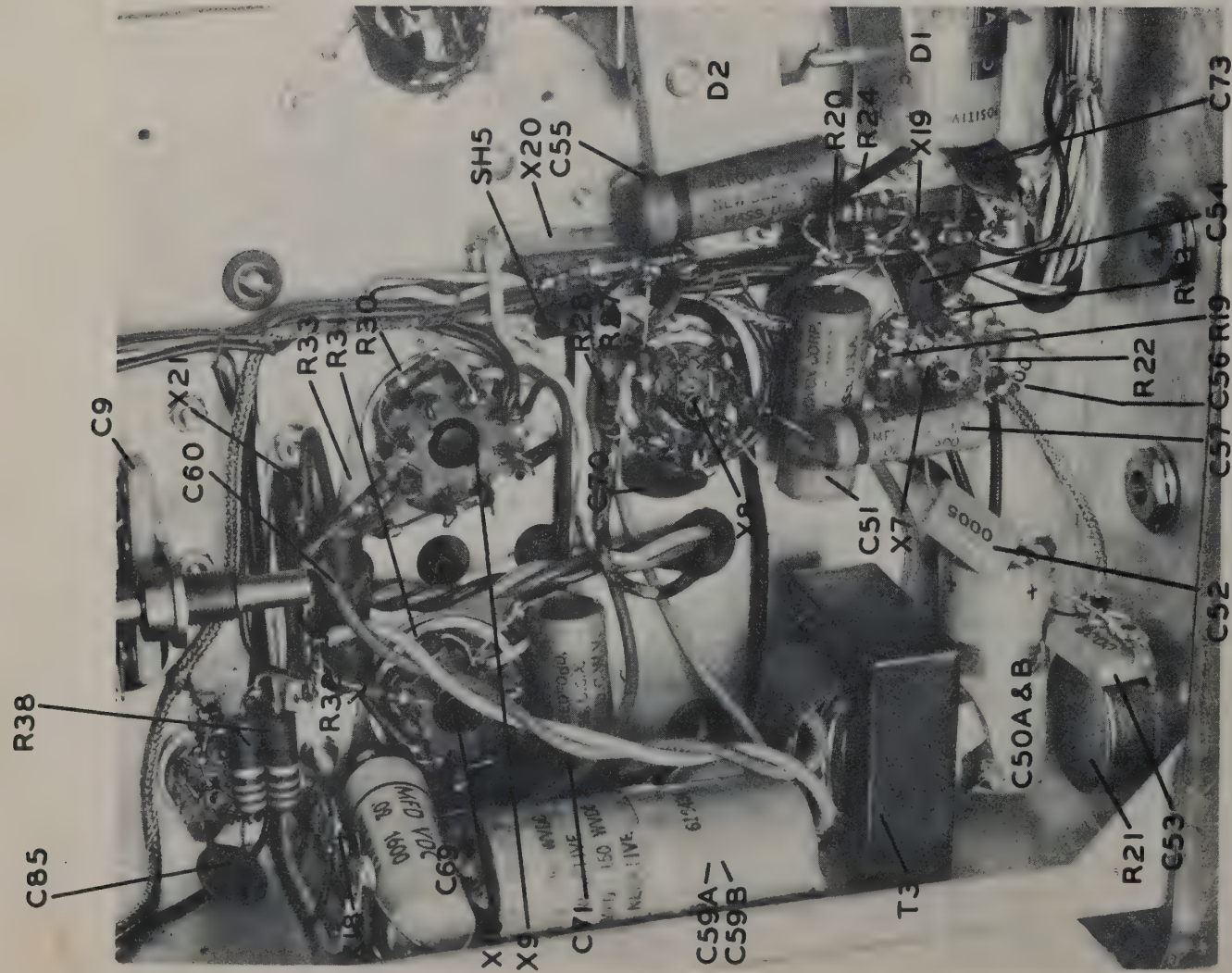


FIGURE 8 A. AUDIO SECTION BOTTOM VIEW.

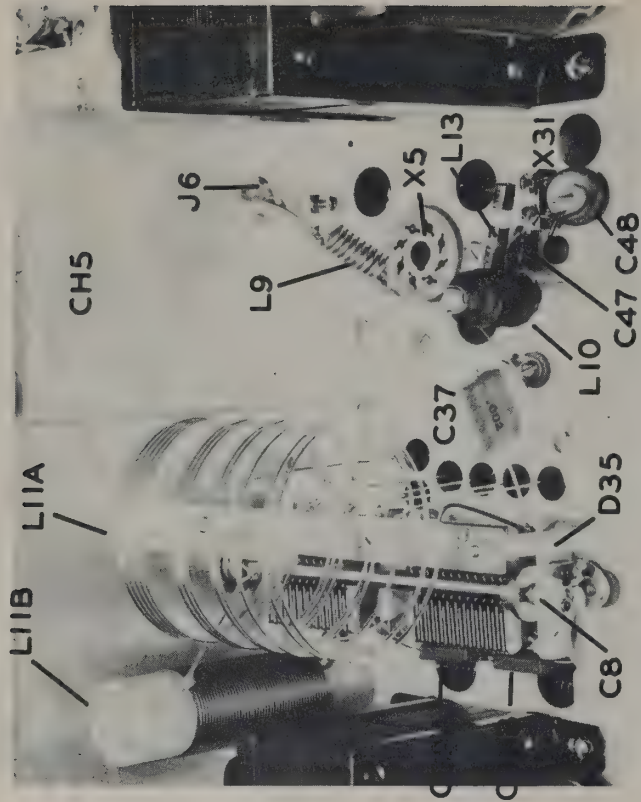


FIGURE 8 B. R.F. FINAL TOP VIEW.

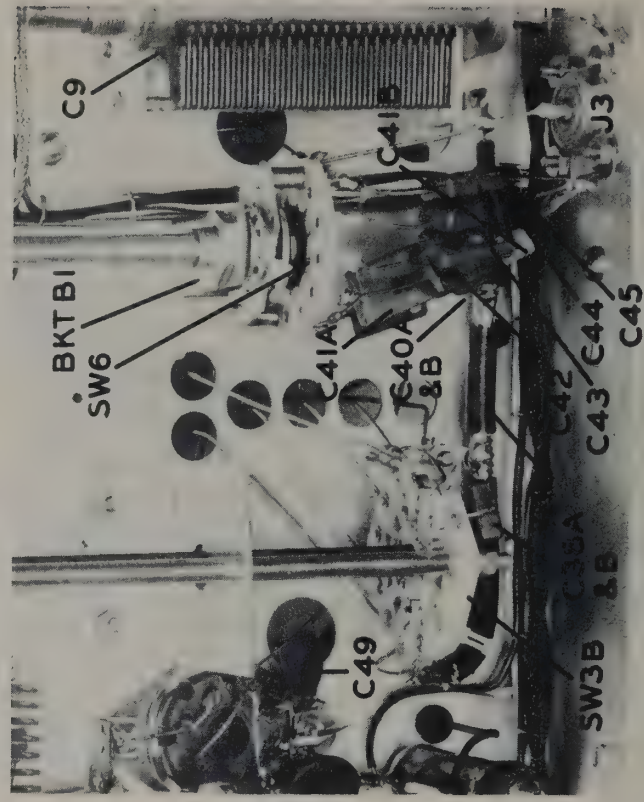


FIGURE 8 C. R.F. FINAL BOTTOM VIEW

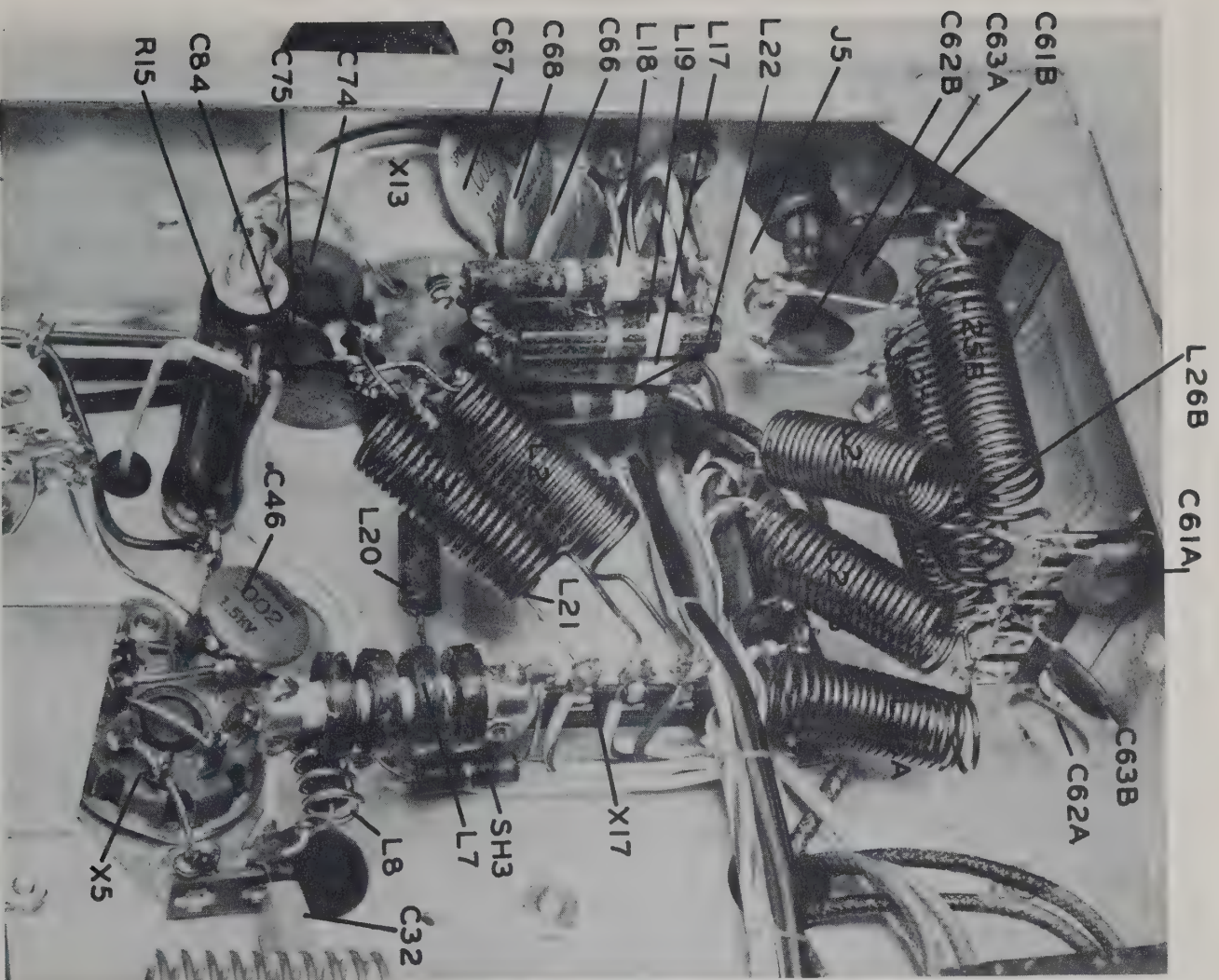


FIGURE 9A. LINE FILTER AND AUXILIARY SOCKET.

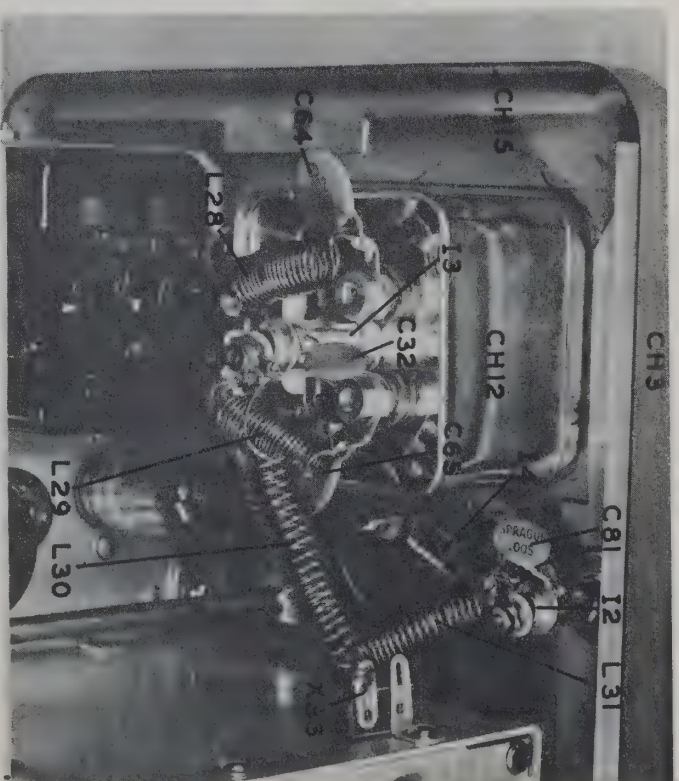


FIGURE 9B. METER SHIELD

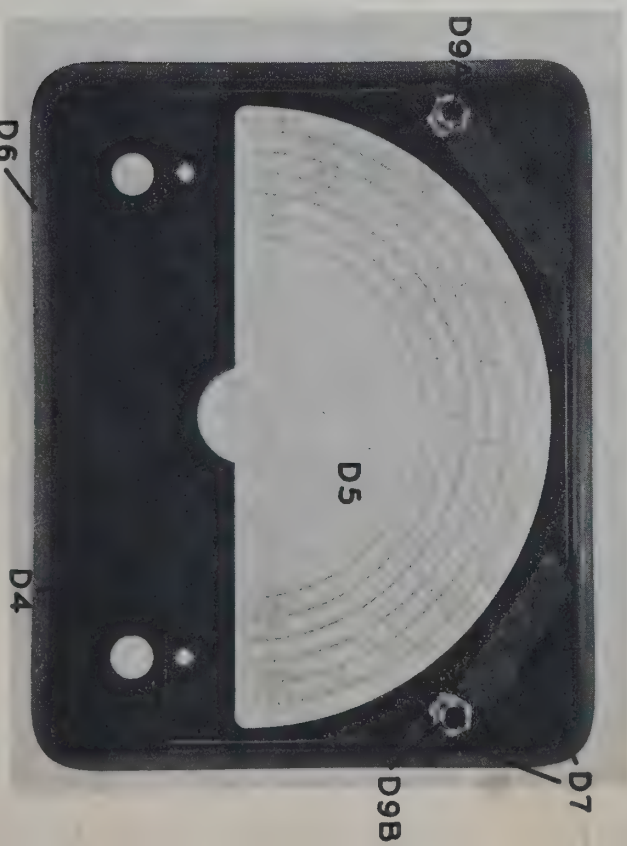


FIGURE 9C. ESCUTCHEON AND DIAL.

FIGURE 10D. FRONT PANEL WITHOUT DIAL AND KNOBS.

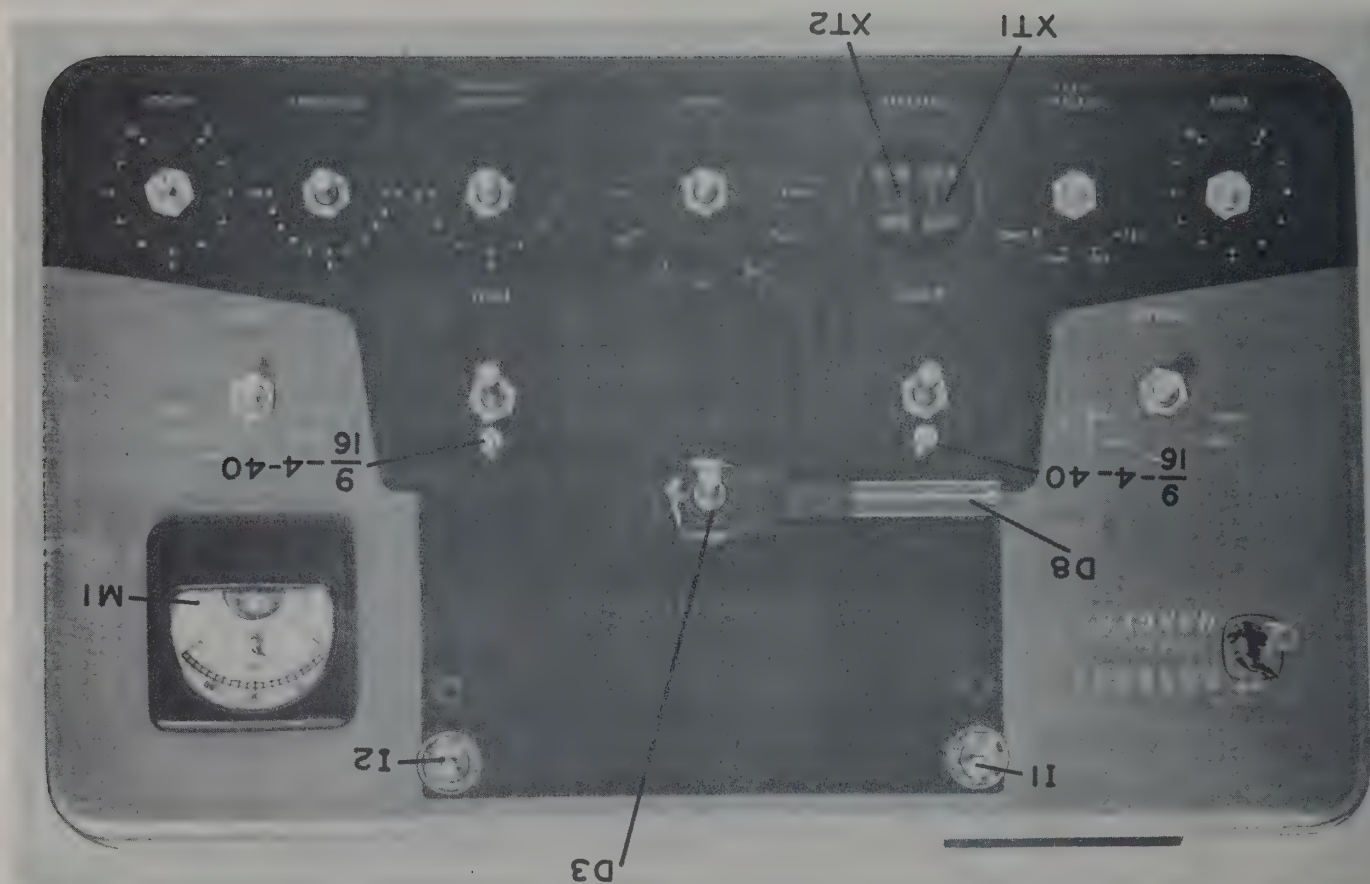


FIG. 10A. V.F.O. TRIMMER SHAFT ASSEMBLY

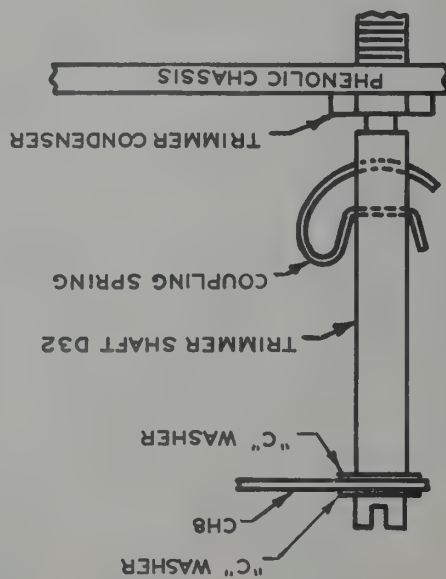
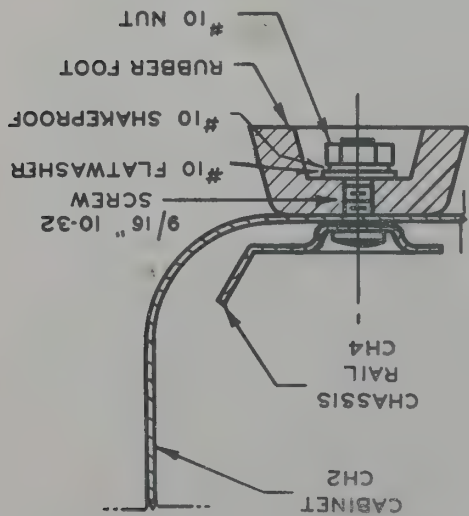


FIG. 10C. CABINET, RAIL, AND FOOT ASSEMBLY



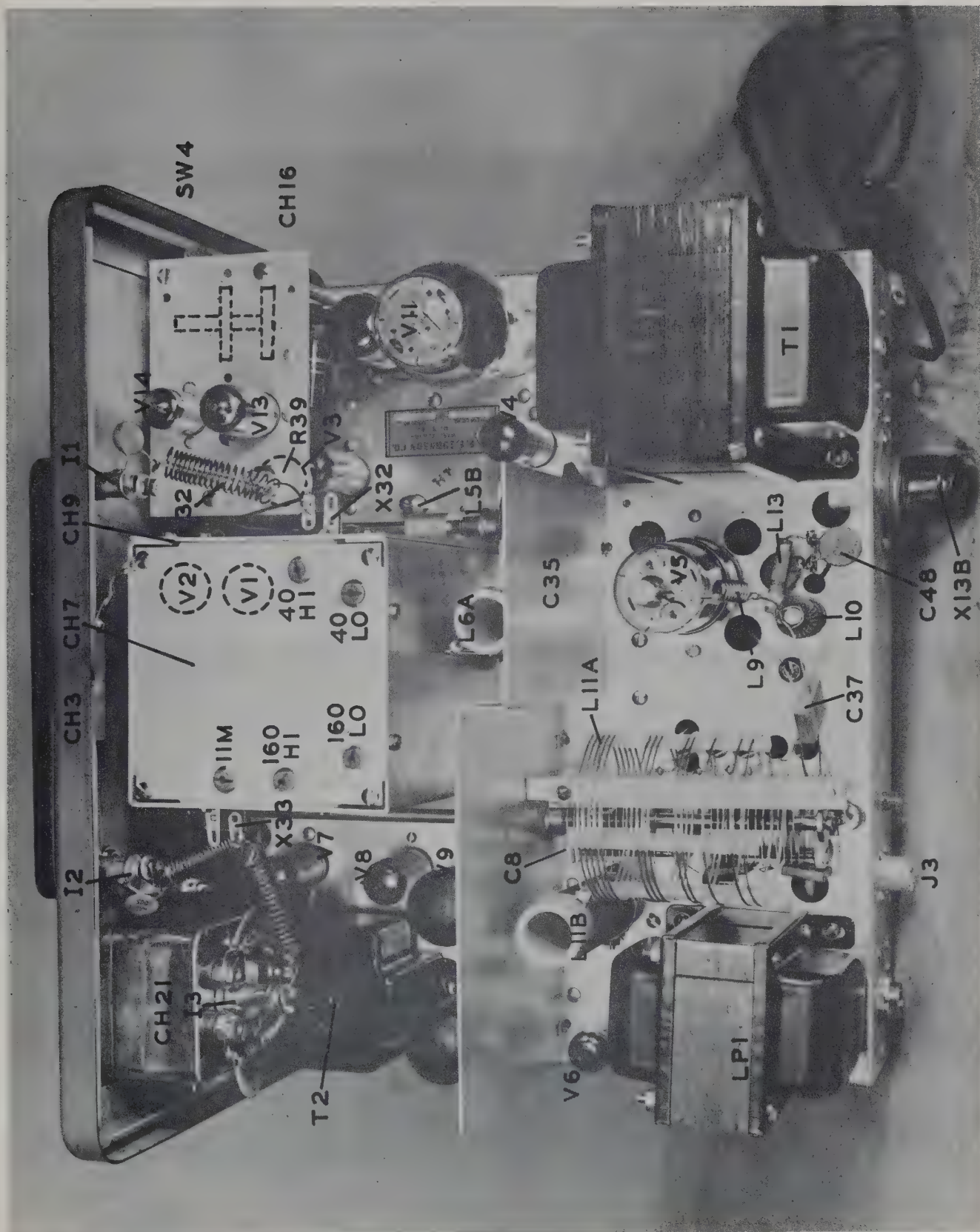
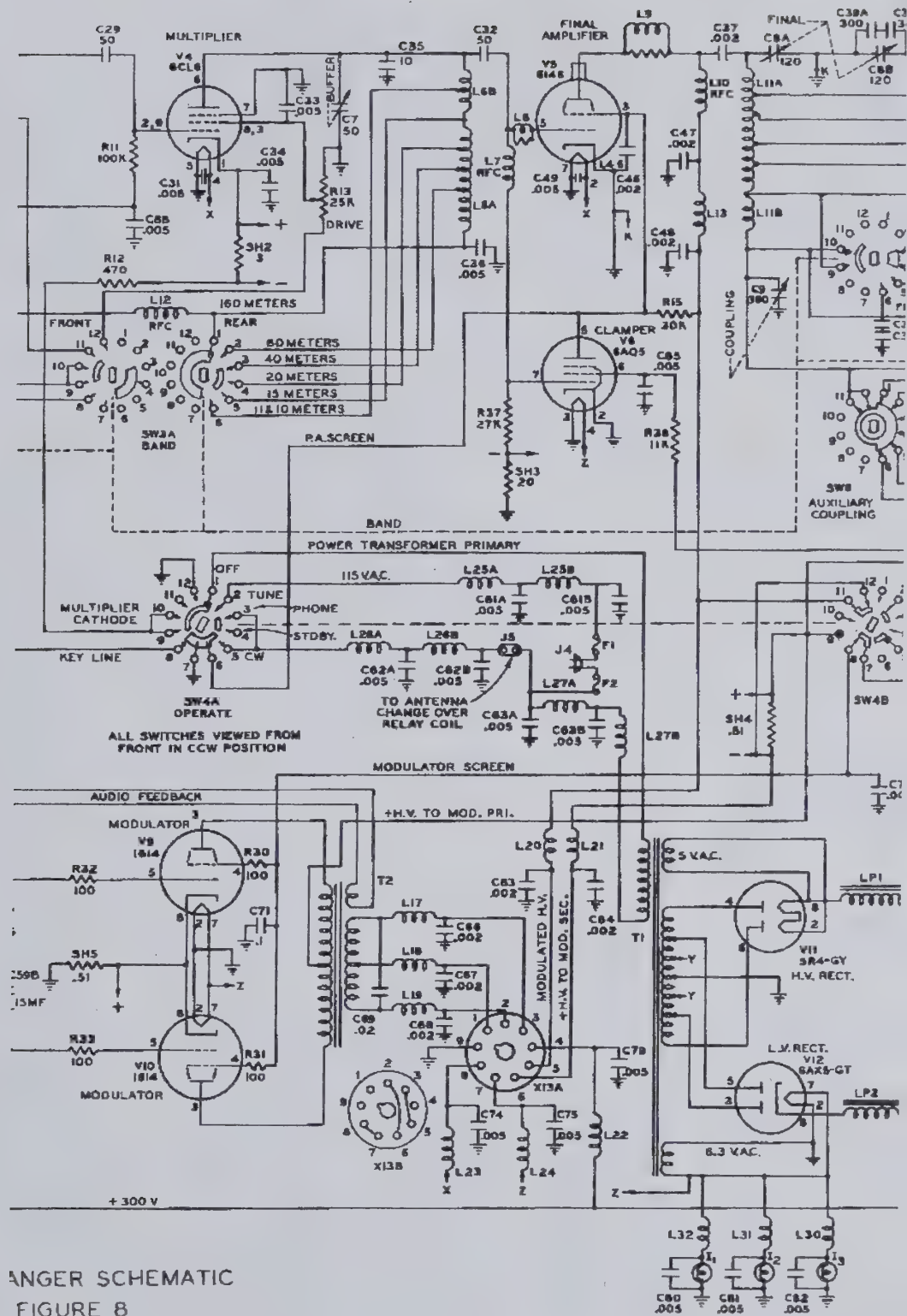


FIGURE 11 COMPLETED CHASSIS TOP VIEW.



FIGURE 12 COMPLETED CHASSIS BOTTOM VIEW.



Ultra High Frequency Receiver

The I-10

When and Power Supply

The "I-10" receiver employs a 4-tube hanging superregenerative detector, consisting of one stage of tuned R.F., coupled to a first stage of audio

954 — R.F.

955 — Detector

6C5 — First Audio

9F6 — Second Audio

employed are as follows:

When double feeders or two-wire lines are employed, an external ground connection is usually undesirable, but this point must be determined by experiment.

While the antenna primaries are of symmetrical construction, mechanical considerations prevent exact balance to ground, and there is some capac-

ity coupling between the windings, especially at the higher frequencies.

Exact recommendations for antenna systems cannot be given, since the dimensions will de-

pend upon the frequency at which best efficiency is desired, directional characteristics, etc. In

general, however, the antenna proper should be

tuned to the received signal. In many installa-

tions this condition may be satisfactorily realized

by tuning the feeders with series or parallel con-

densers. The size of the tuning condensers will

depend upon the frequency of the received signal

and upon antenna dimensions. The transmission

line must be efficient. As a rule, "twisted pair",

or similar lines, are not satisfactory at frequencies

much above 40 or 50 mc., especially where the

length exceeds a full wavelength. The open wire

or transposed line is much better.

Another general rule regarding antennas, is

that any system which is found to be efficient in

transmission will have good efficiency with the

same directional characteristics, etc., in reception.

Output Circuit and Speaker

The plate circuit of the output tube is brought to the output jack, located at the rear left-hand side. There is no output transformer in the re-

ceiver. The speaker requirements are not at all critical. Any good magnetic or dynamic speaker being satisfactory provided the input impedance is approximately 7000 ohms, and provided the

plate current of the output tube (about 25 ma.)

Some magnetic speakers will require a filter ar-

chore and L. mid. condenser combination. There

is no provision for the field excitation of a dy-

namic speaker from the Type 370. 5588 AB power

unit. For this reason, the permanent magnet type

of dynamic speaker is recommended, no field ex-

citation being required.

The headphones jack is located on the front

panel, just below and to the left of the main dial.

This jack is wired into the output of the first

audio stage in such a way that when the phones

Antenna

As the top by a retaining bracket. e (center) terminal of the upper

are mounted in a bakelite tube

ady Type 915 coils, or equivalent,

ent, being held in place by a spring

the rear right-hand corner of the

bas to the R.F. tube. This battery

is used to output a 3-volt C-battery is

with a maximum voltage of 30, but

its will allow the receiver to func-

of the R.F. stage, may both be

is used and the 25,000 ohm screen

is used between the B+ lead and the

is used in the 20,000 ohm

is used in the "A" range

is used in the "B" range

is used in the "C" range

is used in the "D" range

is used in the "E" range

is used in the "F" range

is used in the "G" range

is used in the "H" range

is used in the "I" range

is used in the "J" range

is used in the "K" range

is used in the "L" range

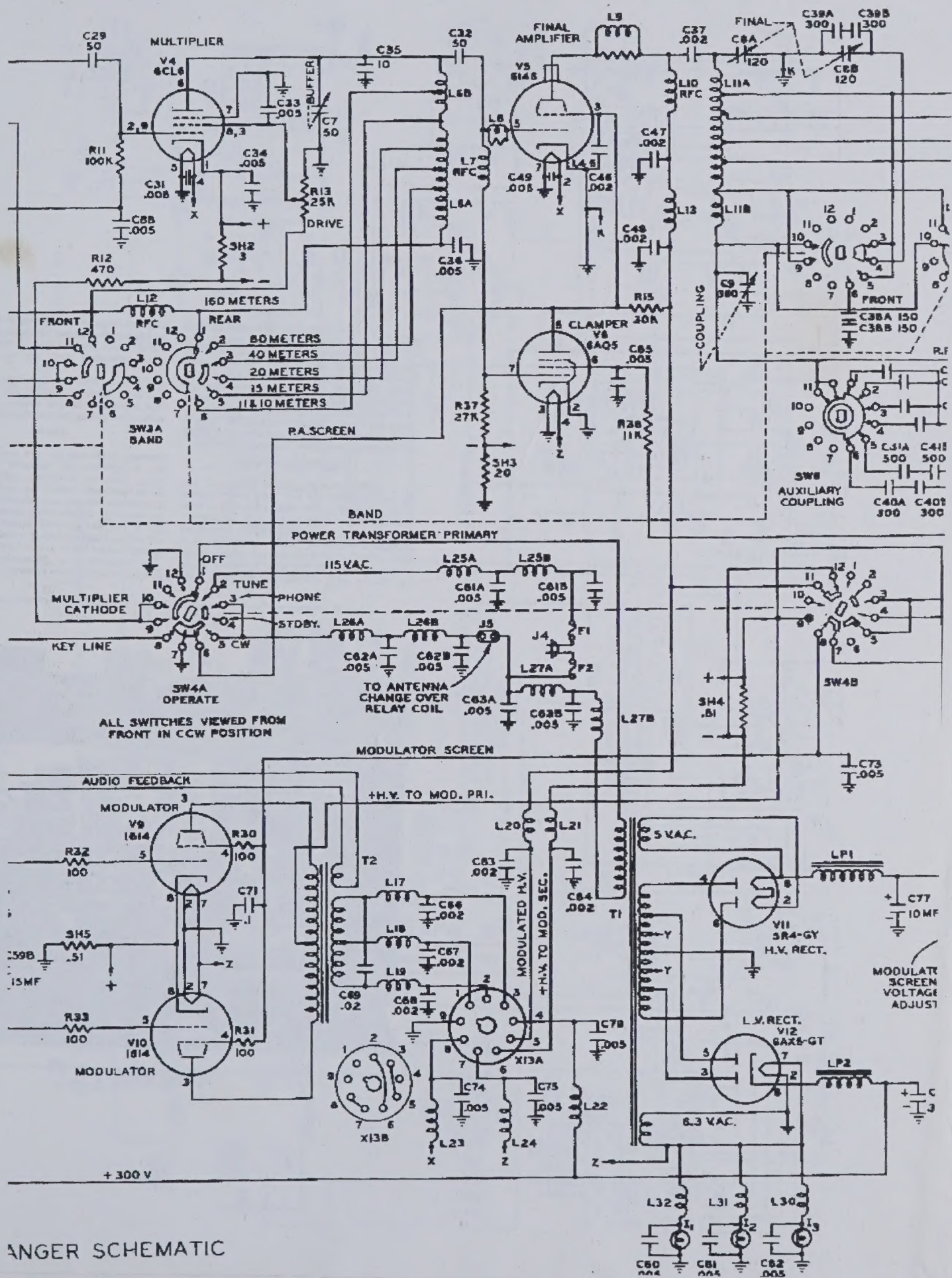
is used in the "M" range

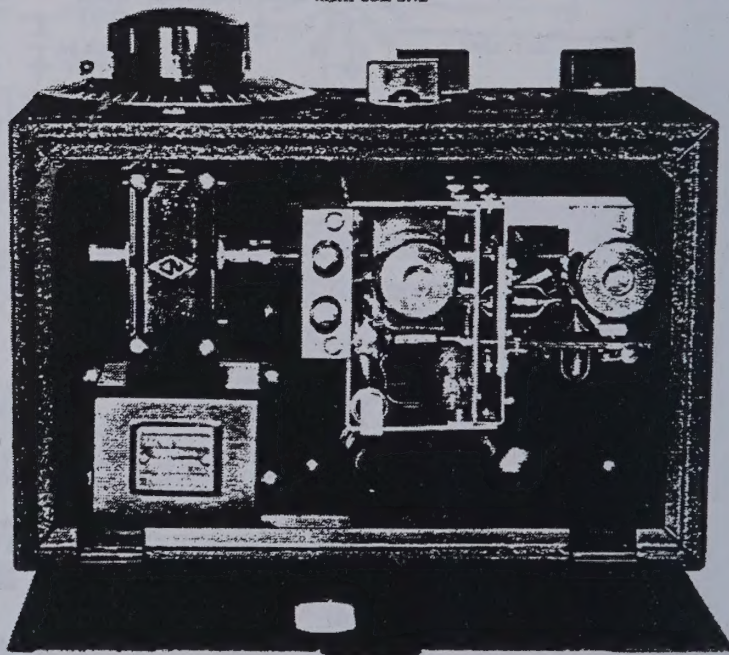
is used in the "N" range

is used in the "O" range

is used in the "P" range

is used in the "Q" range





THE TOP VIEW

From the double-shielding between the R.F. and detector circuit, and the unique arrangement of parts.

dial reading. The switch at the lower right-hand corner breaks the positive B-supply lead and is useful for temporarily rendering the receiver inoperative during periods of transmission or when changing

curves for the various coils are shown on page 7. The curves are accurate to about three per-

Controls

economy. GFR is permissible and will give better battery operated from batteries, the removal of the the voltage might rise above 180 volts. When power supply with the output tube mentioned should not be operated from the above mentioned tip-jacks to connect them together. The receiver connected, a jumper must be inserted in the complete at all times. If the speaker is to be dis-

the experimenter and to the end has been made to have maximum sensitivity and a wide fre-

Operating Characteristics

R.F. circuit, and are marked accordingly. main tuning dial. These control detector regu-

for opening the heater circuit. There are three small dials in addition to the to avoid parasitic drain. No switch is provided

